ARCADIS
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ARCADIS U.S., Inc.
284 Cramer Creek Court
Dublin
Ohio 43017
Tel 614 764 2310
Fax 614 764 1270
www.arcadis-us.com

Mr. Michael Mikulka
Waste, Pesticide & Toxics Division
U.S. Environmental Protection Agency
Region 5, Mail Code DE-9J
77 W. Jackson Boulevard
Chicago, Illinois 60604-3590

ENVIRONMENT

Subject:
Revised Current Conditions Report, AK Steel Corporation, Middletown, Ohio

Date:
April 8, 2010

Contact:
Nancy Gillotti

Phone:
614 764 2310

Email:
ngillotti@arcadis-us.com

Our ref:
OH000960.0015

Dear Mr Mikulka:

Pursuant to Attachment 2: RFI/CMS SOW Part 1 of the Consent Decree, which became effective on May 15, 2006, AK Steel Corporation is submitting the revised Current Conditions Report for the Middletown Works. Please contact Mr. James Kemp of AK Steel (513-425-6177) with questions regarding this project.

Sincerely,

Nancy A. Gillotti
ARCADIS U.S., Inc.,
Project Manager

James B. Kemp
AK Steel Corporation,
Senior Staff Environmental Engineer

Copies:
Robert Guenther, Esq., U.S. EPA
Compliance Tracker, U.S. EPA
Chief, Environmental Enforcement Section, U.S. EPA
Jeff Hines, Ohio EPA
Chief, Environmental Enforcement Section, Ohio Attorney General's Office
Marilyn Wall, Sierra Club
Ex Kano Sams II, Esq., Lerach Coughlin Stoia Geller Rudman & Robbins LLP
Carl Batliner, AK Steel
Pat Gallo, AK Steel
David Horn, Esq., AK Steel
Tim Barber, ENVIRON

Infrastructure, environment, buildings

Current Conditions Report

AK Steel Corporation
Middletown Works
Middletown, Ohio

Original: September 11, 2006
Revised: April 8, 2010

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List of Acronyms

AA	Additional areas of potential contamination
AK Steel	AK Steel Middletown Works
AMSL	Above mean sea level
AOC	Area of concern
ARMCO	American Rolling Mill Company
B.F.	Blast Furnace
bls	Below land surface
BOF	Basic Oxygen Furnace
BUSTR	Bureau of Underground Storage Tank Regulations
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CCR	Current Conditions Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Corrective Measures Study
COG	Coke Oven Gas
COPECs	Chemicals of potential ecological concern
CSO	Combined sewer overflow outfalls
DAF	Dilution Attenuation Factor
DBH	Diameter at Breast Height
DQO	Data quality objective
EGL	Electrogalvanizing Line
EPT	Trichoptera taxa
ERA	Ecological risk assessment
ESL	Ecological Screening Level

HHRA	Human health risk assessment
HSM	Hot Strip Mill
HWMU	Hazardous waste management unit
IBI	Index of Biotic Integrity
ICI	Invertebrate Community Index
IM	Interim Measures
mg/kg	Milligrams per kilogram
mIWB	Modified Index of Well-Being
MSDS	Material Safety Data Sheet
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NTTP	North Terminal Treatment Plant
OAC	Ohio Administrative Code
ODOT	Ohio Department of Transportation
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
O&M	Operations and maintenance
OMZA	Outside Mixing Zone Average
PAHs	Polynuclear aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
POTW	Publicly Owned Treatment Works
PR/VSI	Preliminary review/visual site inspection
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QHEI	Qualitative Habitat Evaluation Index
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation

RSL	Regional Screening Level
SERA	Screening Ecological Risk Assessment
SCM	Site Conceptual Model
SOW	Scope of work
SPCC	Spill Prevention, Control, and Countermeasure
SPL	Spent pickle liquor
SSL	Soil Screening Level
STTP	South Terminal Treatment Plant
SWMU	Solid waste management unit
SVE	Soil Vapor Extraction
SVOCs	Semi-Volatile Organic Compounds
T	Transformer
TCE	Trichloroethene
TDS	Tar Decanter Sludge
ug/L	Micrograms per liter
UIC	Underground Injection Control
USDW	Underground source of drinking water
U.S. EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
VOCs	Volatile organic compounds
VS	Verification Sample
WWTP	Wastewater Treatment Plant

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1. Introduction

The AK Steel Middletown Works (AK Steel), located in Middletown, Ohio, is under a Consent Decree to perform Resource Conservation and Recovery Act (RCRA) Corrective Action with the United States Environmental Protection Agency (U.S. EPA), Ohio Environmental Protection Agency (Ohio EPA), and Plaintiffs. The Consent Decree, which became effective on May 15, 2006, requires AK Steel to implement RCRA Corrective Action consisting of a RCRA Facility Investigation (RFI), Interim Measures (IMs), and Corrective Measures Study (CMS), as necessary to address site conditions.

A preliminary review and visual site inspection (PR/VSI) of the Middletown Works was conducted on behalf of the U.S. EPA in 1991 to determine the facility's current operating status, identify solid waste management units (SWMUs) and areas of concern (AOCs), and assess actual and potential releases to the environment from those units (PRC 1992). As a result of the PR/VSI, 43 SWMUs and seven AOCs were identified. During negotiations for the Consent Decree, the list of SWMUs and AOCs was reviewed by AK Steel and updated to include 43 SWMUs, two hazardous waste management units (HWMUs), 22 AOCs, and nine Additional Areas of Potential Contamination (AAs). A list of these SWMUs/HWMUs/AOCs/AAs included in the RFI/CMS scope of work (SOW) is presented in Table 1. The SWMU, HWMU, and AOC, and AA locations are presented on Figure 1 and Figure 2, respectively. It should be noted that SWMU 10, SWMU 17, and AOC 6 were re-named to better represent their respective unit.

Definitions for the terms SWMUs/HWMUs/AOCs/AAs are presented in the Consent Decree and are repeated below for the purposes of this Current Conditions Report (CCR). *A SWMU means any discernable unit at which solid wastes have been placed at any time regardless of whether the unit was intended for the management of solid or hazardous wastes. Such units include any area at the facility where solid wastes have been routinely or systematically placed or released. A HWMU means a contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area. An area of concern (AOC) means any location of the facility under the control of the owner or operator where a release to the environment of hazardous waste(s) or hazardous constituents has occurred, is suspected to have occurred, or may occur, regardless of the frequency or duration of the release. An additional areas of potential contamination (AA) means (1) any areas of Dicks Creek Floodplain adjacent to Reach 1 or Reach 2 not owned by AK Steel; (2) areas where hazardous waste or hazardous* *constituents have migrated from the facility; and (3) areas identified on Exhibit C to Attachment 2 of the Consent Decree.*

As required in Part 1 of Attachment 2: RFI/CMS SOW to the Consent Decree, a CCR was completed for the SWMUs/HWMUs/AOCs/AAs that are identified in Exhibits A, B, and C (Table 1).

On September 11, 2006, the CCR was submitted to the U.S. EPA, Ohio EPA, and the Plaintiffs of the Consent Decree. The U.S. EPA submitted the disapproval letter entitled *Consent Decree Case Number C-1-00530 EPA Disapproval of Current Conditions Report prepared for AK Steel by Arcadis*, dated October 16, 2009. This letter was received by AK Steel on October 19, 2009.

Based on the content of the comments in the disapproval letter, U.S. EPA, Ohio EPA, Sierra Club, AK Steel, ENVIRON, and ARCADIS met on December 3, 2009. During the meeting, the group discussed each comment and agreed with the comment or agreed to a modification of the comment. Subsequently, the U.S. EPA submitted an addendum entitled *Consent Agreement Case Number C-1-00530 Notification of Modifications to October 16, 2009, EPA Disapproval of Current Conditions Report Subsequent to Conference Held on December 3, 2009, Pursuant to Paragraph 45 of the Consent Agreement.*, dated December 8, 2009. This letter was received by AK Steel on December 11, 2009.

The following SWMUs and AOCs were not retained for further evaluation, based upon the aforementioned disapproval letter (October 16, 2009), and the meeting with the U.S. EPA, Ohio EPA, and the Plaintiffs:

-SWMU 1: North Terminal Wastewater Treatment Plant
-SWMU 5: Terne Coat Satellite Accumulation Areas
-SWMU 12: Blast Furnace/Sinter Plant Wastewater Treatment Facility
-SWMU 18: Former Open Hearth Wastewater Treatment Plant (WWTP)
-SWMU 19: Former Used Oil Storage Area
-SWMU 28: South Terminal WWTP
-SWMU 29: South Terminal Wastewater Treatment Polishing Ponds
-SWMU 30: Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets
-SWMU 32: Hot Slab (or Mill) WWTP
-SWMU 34: Spent Pickle Liquor Filtration System
-SWMU 42: Closed Solid Waste Landfill East of Slag Processing Area Access Road.

-SWMU 43: Closed Solid Waste Landfill
-AOC 5: PCB Transformer Storage Building (next to former Open Hearth WWTP)
-AOC 8: Benzene Release Area Possibly Related to AOC 2, Tar Tanks
-AOC 11: Mill Scale Area 1
-AOC 12: Mill Scale Area 2
-AOC 13: Mill Scale Area 3
-AOC 14: Raw Slag Area
-AOC 15: Finished Slag Area
-AOC 16: 7 Oil Transformer Locations ("T" in OMS Area)
-AOC 20: AK/ARMCO Property at Oxford State Road (NS) and Ottawa Street (WS)
-AOC 22: Dredge Spoil Fill Area near corner of Jackson Lane and Lefferson Road
-AOC 24: Dredge Spoil Fill Area on the north side and parallel to Oxford Sate Road running from North Branch of Dicks Creek to Jackson Lane Ditch (4000')

After further evaluation by AK Steel, the following additional SWMUs and HWMUs are considered not retained for further evaluation:

-SWMU 10: Dorr Thickener and East Aboveground Tank
-SWMU 13: Basic Oxygen Furnace (BOF) Wastewater Treatment Facility
-SWMU 14: Coke Plant Wastewater Equalization Tank
-SWMU 21: Former Used Oil Accumulation Area (by Sinter Plant)
-SWMU 33: Spent Pickle Liquor Tank Farm
-SWMU 44: Coke Oven Gas Pipeline and Release Area
-HWMU 1: Easternmost Spent Pickle Liquor Injection Well (SWMU 35)
-HWMU 2: Westernmost Spent Pickle Liquor Injection Well (SWMU 36)

Pursuant to Part 1 of Attachment 2 of the Consent Decree, this CCR includes Facility Background (Section 2), Preliminary Assessment of Nature and Extent of Contamination (Section 3), Preliminary Site Conceptual Model (Section 3), and Description of Interim/Stabilization Measures (Section 4). In addition, a summary of the SWMUs/HWMUs/AOCs/AAs (Section 5, Table 1, and Appendix A), and screening and release assessment and unit groupings site conceptual models (Sections 6 and 7) are included. Supporting information is also presented in the following appendices to this CCR:

- Appendix A SWMU/HWMU/AOC/AA-Specific Data – a data sheet is prepared for each unit which is retained for further evaluation and summarizes a description of the process that occurs or occurred at the unit, the approximate size of the unit, and major pieces of equipment associated with the unit; the general location of the unit within the plant areas; the period of time in which the unit has been or was in operation; information regarding waste management practices for the unit, including the process that generated the waste, if applicable, and the type of wastes expected to be located at the unit; a description of any engineered features designed to control potential releases to the environment; a description of historical releases that are documented and evidence of releases observed; a summary of any previous investigations that have been conducted at the unit; data gaps; a list of the sources used to obtain information regarding the unit.

- Appendix B: Aerial Photographs and Sanborn Maps – copies of aerial photographs and Sanborn Maps used to support the facility history and current conditions are presented in electronic format.

- Appendix C: Facility Drawings – copies of diagrams that show the current plant layout, layout of process equipment, and a facility drawing that identifies building locations are presented in electronic format.

- Appendix D: On-Site/Off-Site Well Logs – copies of all available on-site soil boring and monitoring well logs and off-site well logs within a 1-mile radius of the facility are presented in electronic format.

- Appendix E: Site Data – copies of release information, analytical data from previous soil and groundwater investigations, Great Miami River previous investigations, Refinement of the Groundwater Flow Model, and groundwater contour maps for the upper, intermediate, and lower aquifers are presented.

- Appendix F: Dicks Creek Focused CCR – the CCR prepared to address the section of Dicks Creek between AK Steel Outfall 004 and Reach 1 (ENVIRON 2005a).

- Appendix G: Screening Levels – the Regional Screening Levels and Region 5 Ecological Screening Levels used to screen historical data are presented. Additional screening value sources used to supplement the screening of historical data for the Great Miami River are also included (Section 3.2.10).

2. Facility Background

The following section presents the Facility Background, pursuant to Attachment 2 RFI/CMS SOW of the Consent Decree.

2.1 Sources Consulted

The sources used to prepare this CCR are listed in Section 8 References. The primary sources include the PR/VSI, Consent Decree, previous investigations, and readily available publications from state and local agencies.

2.2 Facility Areas

AK Steel is located near the City of Middletown in Butler County in the southwestern area of Ohio (Figure 3). The facility encompasses approximately 2,600 acres and, for the purposes of this report, is divided into five areas which are involved in various aspects of steel manufacturing and processing. The facility is categorized as follows: (1) North Plant Area, (2) Melt Plant Area, (3) South Plant Area, (4) Former Coil Paint Area (SWMU 23), and (5) Slag Processing Area (Figure 4).

2.3 Facility History

In 1901, the American Rolling Mill Company (ARMCO) operated in Middletown, Butler County, Ohio. The company produced rolled sheets of steel that required large amounts of man power. ARMCO began producing rolled steel into coils in 1921, which became a widespread process in their other plants. Over time, ARMCO changed its name to Armco Steel Corporation, and then to Armco Inc. in 1978. In 1989, Middletown Works became a 50/50 partnership company between Armco Inc. and Kawasaki Steel. It was named Armco Steel Company, L.P. In 1994, the L.P. was spun off and became AK Steel Corporation. In 1999, Armco, Inc. merged with AK Steel Corporation, where it has associated plants in Ashland, Kentucky; Butler, Pennsylvania; Coshocton, Ohio; Mansfield, Ohio; Zanesville, Ohio; and Rockport, Indiana. Formerly, AK Steel owned and operated the Coil Paint Area. In 1993, AK Steel sold the Coil Paint Area to Material Science Corporation but maintained ownership of SWMU 23 (Figure 4).

2.4 Facility Description

AK Steel is a fully integrated plant producing carbon steels, stainless steels, hot dipped aluminized steels, hot dipped galvanized steels, and coated steels. In addition, the facility produces finished and coated steels. Hot rolled steels are used where heavy thickness, strength levels, and formability are required. The steels produced at the plant are used in a variety of applications in automotive, appliance markets, and construction markets. These include frame components, brackets, brake components, wheels, clutch plates, tubing, and compressor shells. Construction, industrial machinery, agricultural equipment, railroad, and ship building are all areas where steels are used for panels, frames, and component parts. Cold rolled steels provide excellent press formability, surface finish, and thickness and flatness tolerances. Cold rolled steels can be used to produce parts containing simple bends to parts with extreme deep drawing requirements. Hot dipped aluminized, hot dipped galvanized, and electrogalvanized steels are best suited for applications where surface finish, corrosion resistance, or both are critical. Examples of such applications include automotive, appliance, agricultural equipment, and architectural products (AK Steel Product Data Bulletin, 2000).

2.4.1 Aerial Photograph Review

Historical aerial photographs from various sources were obtained and reviewed. Photographs were obtained for the years 1938, 1956, 1961, 1962, 1968, 1976, 1980, 1986, 1993, 1999, and 2007. Aerial photographs could not be obtained between 1938 and 1956, which is considered a data gap. Historical aerial photographs covering the site were obtained from AK Steel, the Ohio Department of Transportation (ODOT) and the Butler County Soil Conservation Service. Scales ranged from approximately 1 inch equals 200 feet, to 1 inch equals 2,000 feet. Copies of all photographs are included in Appendix B. The aerial photograph review was divided into the following sections and significant features identified on the photographs are briefly described below.

- North Plant Area,
- Melt Plant Area,
- Former Coil Paint Area (SWMU 23),
- South Plant Area,

- Slag Processing Area (Former OMS Area), and
- Additional Areas South of Oxford State Road.

2.4.1.1 North Plant Area

July 1938 (scale 1" = 1,320') – The North Plant Area features shown on this photo shows the plant under construction with the exception of the northern edge of the property. Railroad tracks enter the North Plant Area from the northwest and the southeast and extend throughout the Plant into many of the site buildings for loading and delivery. Residential/undeveloped properties border the North Plant Area in all directions.

March 1956 (*scale 1" = 800')* – The North Plant Area features shown on this photo are similar in nature as compared to 1938; however, an increased number of buildings are now present on site. Within the North Plant Area, three aboveground storage tanks are evident along the southwest corner of the site and a small body of water is present southeast of Building No. 5109. SWMUs 1 and 2 are visible (North Terminal WWTP and WWTP Concentrator Pit). The eastern edge of the North Plant Area appears to be a storage yard of some type and building construction activities are depicted in this area as well. Railroad tracks border and traverse the site and numerous service roads and small vehicle parking lots are present. Two areas of the North Plant Area appear to be undeveloped; south of the storage yard and west of the Main Gate Parking Lot, located on the northwest portion of the North Plant Area. Two irregularly shaped drainage basins are present on the north boundary property that could be associated with stormwater drainage from the plant operations. Surrounding properties in the 1956 photo include a recreational park; undeveloped area and residential homes to the west; residential homes to the east; and the AK Steel Melt Plant Area to the south.

March 1961 (*scale 1" = 800')* – The North Plant Area features shown on this photo remains unchanged (compared to 1956), with the exception of an area comprised of disturbed soil (southeast of Building Number 5406 located on the southeast portion of the North Plant Area) that may be indicative of construction activities. Surrounding properties remain unchanged compared to 1956.

October 1968 (scale *1" = 660')* – The North Plant Area features shown on this photo are similar as compared to 1961, except that construction activity on the eastern portion of the North Plant Area is complete. A parking lot is present on the western portion of the site. Two unidentified areas are present in same vicinity. The first area is possibly composed of rows of material or disturbed soil that may be indicative of construction activities and the second area is a railroad spur. Both are depicted south of Building No. 5406. Surrounding properties remain unchanged compared to 1961.

April 1976 (*scale 1" = 2,000')* – The North Plant Area features shown on this photo are primarily unchanged as compared to 1968, with the exception of the unidentified areas near Building No. 5406. In addition, the two northern drainage basins are no longer present. Surrounding properties remain predominantly unchanged, except for increased industrial development to the west and northwest.

March 1980 (*scale 1" = 1,000')* – The North Plant Area features shown on this photo remain primarily unchanged as compared to 1976, however the area south of Building 5406 consists of one larger coal pile area. Further south of this area is the beginning stages of the North Plant Connector. Substation 1A is clearly visible southwest of the coal pile. In addition, two new smaller buildings are present west of the Middletown Works Entrance and west of the underpass tunnel of Roosevelt Boulevard. These buildings are now the Credit Union and A.E.I.F buildings, respectively. East of Yankee Road is a rather extensive area composed of large buildings and associated parking lots. Surrounding properties remained unchanged (compared to 1976).

March 1986 (*scale 1" = 1,000')* – The North Plant Area features shown on this photo remain primarily unchanged as compared to 1980. The North Plant Connector appears complete. There is no evidence of the coal pile south of Building 5406; however, a small area of land disturbance that may be indicative of construction activities is noted on the western portion of the former coal pile area. A high tension power line tower is evident southeast of Building 5406. Surrounding properties remained unchanged (compared to 1980).

March 1993 (*scale 1" = 1,000')* – The North Plant Area features shown on this photo remain primarily unchanged as compared to 1986. The buildings on the southwestern portion of the site have been demolished. Surrounding properties remained unchanged (compared to 1986).

March 1999 (*scale 1" = 2,000')* – The North Plant Area features shown on this photo remain primarily unchanged as compared to 1993. Conditions appear to be the same as today. Surrounding properties remained unchanged (compared to 1993).

March 2007 (*scale 1" = 200')* – The North Plant Area features shown on this photo remain primarily unchanged as compared to 1999. Surrounding properties remained unchanged (compared to 1999).

2.4.1.2 Melt Plant Area

July 1938 (scale 1" = 1,320') – The Melt Plant Area features shown on this photo has not been developed and the area consists of undeveloped farmland. Railroad tracks are present on the eastern portion of the future location of the Melt Plant. The AK Steel North Plant is depicted to the north; while railroad tracks and undeveloped land is depicted to the east of the future location of the Melt Plant. Residential homes are depicted to the south, with Oxford State Road located beyond. In addition, a residential subdivision is present on the northeast quadrant of Yankee Road and Oxford State Road (west of the future location of the Melt Plant).

March 1956 (*scale 1" = 800')* – The Melt Plant Area features shown on this photo is now developed and active compared to 1938*.* Much of the Melt Plant Area is comprised of structures surrounded by disturbed soil that may be indicative of construction activities. Railroad tracks border and traverse the site as well as numerous service roads and small vehicle parking lots. Two adjoining ponds are depicted on the northwest portion of the Melt Plant Area and according to AK Steel personnel; the water for these ponds is obtained from the Great Miami River, located approximately 2 miles west of the site. Southwest of the two adjoining ponds a linear portion of land which appears to contain some type of liquid. Additionally, the Dorr Thickener and East Aboveground Tank (SWMU 10), Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds (SWMU 11), and Blast Furnace/Sinter Plant Wastewater Treatment Facility (SWMU 12) are also present in the central portion of the Melt Plant Area. The former Benzol Tank Farm Area (SWMU 20), the Former Rail Car Transfer Area (AOC 4), and two Tar Tanks (AOC 2) are present along the southern edge of the Melt Plant Area near the existing Coke Plant entrance gate off Oxford State Road. South of this area and a section of railroad tracks, lies a large coal storage yard. The southeastern portion of the Melt Plant Area is undeveloped. Coal or other material is depicted in the area west of the Melt Plant Area, north of the residential area. Surrounding properties remain as previously identified (compared to 1938) with the exception of slag management activities located to the east (future South Plant Area).

March 1961 (*scale 1" = 800')* – The Melt Plant Area features shown on this photo remains primarily unchanged as compared to 1956. However, five small liquid ponds, and one large rectangular liquid pond are present southeast of BOF operations. The south liquid ponds appeared to be two former tar lagoons that were in the vicinity of the former Robin Hood Coal Pile (SWMU 17). Surrounding properties remain as previously identified (compared to 1956).

October 1968 (*scale 1" = 660')* – The Melt Plant Area features shown on this photo remain primarily unchanged as compared to 1961. The Robin Hood Coal Pile is first depicted in this aerial photograph. In addition, a large coal/coke piles are located west boundary of the Melt Plant Area. The southeast portion of the Melt Plant Area is now developed with numerous buildings, roads, train tracks and associated parking lots. A large area utilized as a parking/equipment storage yard is noted on the eastern central portion of the plant. Surrounding properties remain as previously identified (compared to 1961).

April 1976 (*scale 1" = 2,000')* – The Melt Plant Area features shown on this photo remain primarily unchanged (compared to 1968), with the exception of two new coke battery buildings located northeast of the Benzol Tank Farm Area (SWMU 20). These buildings were reported built in 1975. Surrounding properties remain the same compared to 1968.

March 1980 (*scale 1" = 1,000')* – The Melt Plant Area features shown on this photo identifies the Coke Plant Wastewater Equalization Tank (SWMU 14), and the Former Open Hearth WWTP (SWMU 18). Overall, the 1980 aerial is similar as compared to 1976; however, the parking/equipment storage yard is no longer present, which was first identified in the 1968 aerial. The parking/equipment storage yard is now used as a large coal storage yard. Coal storage is also present on the northwest portion of the Melt Plant Area. Surrounding properties remain as previously identified (compared to 1976).

March 1986 (*scale 1" = 1,000')* – The Melt Plant Area features shown on this photo remain primarily unchanged (compared to 1980). Surrounding properties remain as previously identified (compared to 1980).

March 1993 (*scale 1" = 1,000')* – The Melt Plant Area features shown on this photo remains primarily unchanged (compared to 1986). However, demolition activities appear to be in progress at the Benzol Tank Farm (SWMU 20). Surrounding properties remain as previously identified (compared to 1986).

March 1999 (*scale 1" = 2,000')* – The Melt Plant Area features shown on this photo does not present the Benzol Tank Farm (SWMU 20), former Open Hearth WWTP (SWMU 18) and the western tar tank (AOC 2). The remaining areas appear to be the same as compared to 1993.

March 2007 (*scale 1" = 200')* – The Melt Plant Area features shown on this photo does not present the western tar tank (AOC 2). The remaining areas appear to be the same as compared to 1999.

2.4.1.3 Former Coil Paint Area (SWMU 23)

July 1938 (scale 1" = 1,320') – The Former Coil Paint Area has not yet been developed and consists of undeveloped farmland. Residential homes are present to the north and residential homes and undeveloped farmland are located to the south. Undeveloped land and railroad tracks are present east of the Former Coil Paint Area.

March 1956 (*scale 1" = 800')* – The Former Coil Paint Area remains unchanged as compared to 1938; however, one small road appears to extend across the site. Surrounding properties remain unchanged with the exception of the eastern portion of the Melt Plant Area which has been developed.

March 1961 (*scale 1" = 800')* – The Former Coil Paint Area remains unchanged (compared to 1956). Surrounding properties remain as previously identified with the exception of increasing industrial development to the west.

October 1968 (*scale 1" = 660')* – No coverage was available for the Coil Paint Area in the 1968 aerial photograph.

April 1976 (*scale 1" = 2,000')* – The Former Coil Paint Area is now developed and active. Several small buildings and an equipment yard are present on the eastern portion of the area, while a building comprises the western portion. The Former Coil Paint Wastewater Treatment Lagoons (SWMU 23) are present on the western portion of the site. The southwest portion of the property is undeveloped land.

March 1980 (*scale 1" = 1,000')* – The eastern half of the Former Coil Paint Area remains unchanged as compared to 1976; however, no coverage was available for the western half of the Former Coil Paint Area (SWMU 23). Surrounding properties remain as previously identified (compared to 1976).

March 1986 (*scale 1" = 1,000')* – The entire Coil Paint Area is present on the 1986 aerial photograph. Again, several small buildings and an equipment yard is present on the eastern portion of the area, while a building comprises the western portion. The remaining areas of the site are undeveloped. The Former Coil Paint Wastewater Treatment Lagoons (SWMU 23) are present; but operations are unknown. Surrounding properties remain as previously identified (compared to 1980).

March 1993 (*scale 1" = 1,000')* – The Former Coil Paint Area remains unchanged; however, the SWMU 23 lagoons appeared to have been covered. Two areas of disturbed soil are noted within the woods south of the building on the western portion of the Former Coil Paint Area (outside of the SWMU 23 lagoon area).

March 1999 (*scale 1" = 2,000')* – Conditions appear to be the same as 1993. No changes are noted.

March 2007 (*scale 1" = 200')* – Conditions appear to be the same as 1999. No changes are noted.

2.4.1.4 South Plant Area

July 1938 (scale 1" = 1,320') – The South Plant Area features shown on this photo have not been developed and the area consists of undeveloped farmland and scattered associated farmhouses. The unchannelized North Branch of Dicks Creek flows north to south. Lefferson Road is present to the north with undeveloped farmland located beyond. Oxford State Road is located to the south, with undeveloped farmland and Dicks Creek, located further south of Oxford State Road. Undeveloped farmland is also present to the east. Railroad tracks and undeveloped farmland are present to the west of the future South Plant Area.

March 1956 (*scale 1" = 800')* – The South Plant Area features shown on this photo show a small area of disturbed land on the southwest portion of the current South Plant indicative of construction or slag management activities, possibly the Former Slag Processing Area (SWMU 50). Remaining areas of the South Plant Area are undeveloped farmland. Adjacent properties remain unchanged (compared to 1938) with the exception of the Melt Plant Area which is now present to the west.

March 1961 (*scale 1" = 800')* – The South Plant Area is primarily unchanged (compared to 1956) except the increased development and operations of slag processing (SWMU 50). A small building and associated equipment are present in the slag processing area (SWMU 50). Surrounding properties remain unchanged.

October 1968 (scale *1" = 660')* – The South Plant Area is now developed with manufacturing operations (compared to 1961). Several buildings are present on site and it appears slag processing area is ongoing (SWMU 50). The South Terminal Wastewater Treatment Polishing Ponds (SWMU 29), Hot Slab (or Mill) WWTP (SWMU 32), and the Spent Pickle Liquor Tank Farm (SWMU 33), are present. Surrounding properties remained unchanged, with the exception of the following: Dicks Creek has been channelized and the beginning of slag processing activities south of Oxford State Road.

April 1976 (*scale 1" = 2,000')* – The South Plant Area is primarily unchanged (compared to 1968), except a large area of land disturbance that may be indicative of construction activities located the extreme northwest corner. The western portion of the South Plant Area appears to be utilized as an equipment storage yard, likely the coil storage area, and the Solid Waste Transfer Area (SWMU 37) is also present. It appears the operations of slag processing area (SWMU 50) has terminated. Surrounding properties remained unchanged with the exception of the extension of South Breiel Boulevard located east of the South Plant Area.

March 1980 (*scale 1" = 1,000')* – The South Plant Area is primarily unchanged (compared to 1976), except for Dredge Spoil Fill Area near Jackson Lane and Lefferson Road (AOC 22). AOC 22 is a paved parking lot, prior to being an undeveloped area. In addition, more disturbed land that may be indicative of construction activities is present in the extreme northwest corner of the South Plant Area.

March 1986 (*scale 1" = 1,000')* – The South Plant Area is primarily unchanged as compared to 1980, except for more land disturbance that may be indicative of construction activities in the extreme northwest corner of the South Plant Area.

March 1993 (*scale 1" = 1,000')* – The South Plant Area (compared to 1976), includes land disturbance that may be indicative of construction activities at the Dredge Spoil Fill Area near the corner of Oxford State and North Branch of Dicks Creek (AOC 23) location. The coil storage staging area is now present in the area located west of SMWU 29. Two small land disturbances that may be indicative of construction activities are present southeast of the solid waste transfer area (SWMU 37). In addition the electogalvanizing building is now present east of Building 6032.

Furthermore, continuation of land disturbance that may be indicative of construction activities is present in the extreme northwest corner of the South Plant Area. Additional residential and commercial properties are present to the north and east of the South Plant Area.

March 1999 (*scale 1" = 2,000')* – The South Plant Area is primarily unchanged (compared to 1993), except the activities located in the extreme northwest corner of the South Plant appear to have ceased. Surrounding properties appear unchanged.

March 2007 (*scale 1" = 200')* – The South Plant Area is primarily unchanged (compared to 1999). Some surrounding properties have changed, including an addition of warehouses to the northeast south of South Breiel Boulevard; and expansion of a satellite concrete company (Spurlino Materials) south of Oxford State Road.

2.4.1.5 Slag Processing Area (Formerly OMS Area)

July 1938 *(scale 1" = 1,320')* – The Slag Processing Area is undeveloped and consists mainly of farmland and wooded areas. Dicks Creek is present north of the area, with farmland and Oxford State Road located beyond. Monroe Ditch appears to be present. Undeveloped farmland and wooded areas are depicted to the east, west and south.

August 1950 *(scale 1" = 400')* – The Slag Processing Area is primarily unchanged (compared to 1938), except the appearance of Monroe Ditch. Monroe Ditch is clearly visible as a tree-lined drainage path. Surrounding properties changes include only a few residences north of Oxford State Road.

March 1956 (*scale 1" = 800')* – The Slag Processing Area is primarily unchanged (compared to 1950), except the land disturbance that may be indicative of construction activities present south of Oxford State Road, east of Slag Haul Road.

March 1961 (*scale 1" = 400')* – The Slag Processing Area is primarily unchanged (compared to 1956), except the increased development of residential communities had begun on the south side along Oxford State Road.

August 1962 (*scale 1" = 660')* – The Slag Processing Area is primarily unchanged (compared to 1961), with the exception of a disturbed area that may be indicative of construction activities located on the eastern portion of the site, which is the current slag aggregate area. Dicks Creek is shown to be a meandering stream with small trees along the banks.

November 1962 (*scale 1" = 200')* – The Slag Processing Area is primarily unchanged (compared to August 1962).

February 1966 (*scale 1" = 4,800'*) – The Slag Processing Area is more developed in the north-central portion or the property (near the present-day B Scrap Area). It appears that channelization of Dicks Creek is present on the eastern section of the property. There is development (apparently the metal reclamation operations of McGraw Construction who first developed this area) in the eastern half and southwestern quarter of the Slag Processing Area. A railroad spur is visible immediately south of the current skull-cracker area. Grading activities appear to have begun in the area that would become the solid waste landfill south of Monroe Ditch (SWMU 40).

June 1966 (*scale 1" = 4,800')* – The Slag Processing Area is primarily unchanged (compared to 1966), with the exception of the skull-cracker building being clearly visible. Dicks Creek appears to be undergoing channelization.

October 1966 (*scale 1" = 2,400')* – The aerial photograph presents the channelization of Dicks Creek as far east as the Slag Haul Road. In addition, Outfall 002 is visible on the northern side of Dicks Creek. It appears that the present-day area of the northern solid waste landfill (SWMU 41) is being used as a staging area to support channelization activities along Dicks Creek. Railroad spurs are visible in the east-central portion of the Slag Processing Area, and clearing/filling activities are continuing in the north-central portion. It appears that reclamation operations were ongoing in the central portion of the Slag Processing Area. Several ponds in the Former Oil Separator Ponds (SWMU 47) are visible in the southwestern portion of the Slag Processing Area. There is an abrupt change in the width of Dicks Creek west of the skull-cracker building, as the creek is significantly wider than shown on the June 1966 photograph and the entire channel appears to be filled with water. East of the building, the creek is very narrow, and it is not clear whether there was water in the creek at the Slag Haul Road bridge. There is no indication of an earthen dam across the channel, nor is there indication of a culvert diverting water out of the channel.

October 1968 (scale *1" = 660')* – The Slag Processing Area is primarily unchanged (compared to October 1966), with the exception construction activities in the Closed Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Notification Solid Waste Landfill (SWMU 39). In addition, two ponds are present in the landfill. SWMU 38 (Closed Solid Waste Landfill by Yankee Road and Dicks Creek) appear to be used as a small parking area. SMWU 47 (Former Oil Separator Ponds) is present. A building is present in the area of AOC 18 and AOC 19. Disturbed earth is also noted in the area of SWMU 40 (Closed Solid Waste Landfill). Dicks Creek appears to have been channelized. Monroe Ditch is clearly visible as a drainage feature carrying surface water from both upstream areas and the surrounding farmland. Adjacent properties remain unchanged with the exception of increased industrial use to the west.

April 1973 (scale *1" = 500')* – The Slag Processing Area is developed across the entire present-day Slag Processing Area (compared to 1968). Several buildings (later reported to be a Maintenance Garage, oil storage facility, and Compressor Building) are visible in the south-central portion of the area. Approximately 10 ponds are visible west of Monroe Ditch, near the western boundary of the area (SWMU 39). Waste placement west of Monroe Ditch is also visible (SWMU 39). Seven ponds in SWMU 47 (Former Oil Separator Ponds and Vicinity) are visible, and northeast of these ponds are two smaller, circular ponds. A drainage swale (AOC 17 Former Drainage Path) is visible along the southern boundary of the area, between the southeastern ponds and Monroe Ditch. Mill Scale Area 1 (AOC 11), Mill Scale Area 2 (AOC 12), and Mill Scale Area 3 (AOC 13) appear to be active. Several railroad spurs and haul roads traverse the area, in configurations similar to the present-day configurations. Railroad tracks are also visible south and west of the Slag Processing Area, and roadways are under construction northeast and east of the area.

April 1976 (*scale 1" = 2,000')* – The Slag Processing Area is primarily unchanged (compared to 1973), with the exception that SWMUs 38 and 41, solid waste landfills, are now in use. The western portion of SWMU 39 is composed of thirteen ponds and appears to be the largest and most active solid waste landfill. SWMUs 42 and 43 (Closed Solid Waste Landfill east of Slag Processing Area Access Road and Closed Solid Waste Landfill) appear as undeveloped land. Several small ponds are depicted in a cluster in this aerial photograph and are identified as Former Oil Separator Ponds and vicinity (SWMU 47). Two lagoons located in the Mill Scale Area 2 (AOC 12) are observed within the aggregate area, located within the central portion and southwest corner of the aggregate area.

March 1980 (*scale 1" = 1,000')* – The Slag Processing Area is primarily unchanged (compared to 1976).

April 1980 (*scale 1" = 500')* – The Slag Processing Area is primarily unchanged (compared to March 1980) with the exception that approximately 17 ponds (SWMU 39) are visible west of Monroe Ditch. Slag processing operations are ongoing across the entire present-day Slag Processing Area. The Former Drainage Path (AOC 17) along the southern boundary is still visible and appears to contain liquids. Several additional structures are visible in the central and east-central portion of the area. Waste placement is ongoing in the solid waste landfills along Monroe Ditch (SWMUs 38, 41, and 42). Aboveground tanks have been installed and other buildings constructed at a property southeast of the area.

January 1982 (*scale 1" = 500')* – The Slag Processing Area is primarily unchanged (compared to April 1980). Conditions appear to be similar to present-day conditions. Solid waste landfill (SWMU 38) and solid waste landfill and associated ponds (SWMU 39) are capped.

March 1986 (*scale 1" = 1,000')* – The Slag Processing Area is primarily unchanged (compared to 1982) with the exception of SMWU 42 appearing to be in use. The western and southern portions of the Slag Processing Area are not present in this aerial photograph.

In April 1986 (*scale 1" = 500')* – The Slag Processing Area is primarily unchanged (compared to March 1986) with the exception of Mill Scale Areas 1, 2, and 3 (AOCs 11, 12 and 13, respectively) are discernable. In addition, the ponds (SWMU 47) in the southeastern portion of the area are closed. The Former Drainage Path (AOC 17) along the southern boundary of the area is visible but does not appear to contain water. In addition, landfill (SWMU 42) parking areas have been constructed along a portion of the Former Drainage Path. Several conveyor belts and ancillary structures are visible in the central portion of the area. There are no changes to the northeastern or eastern portions of the area and no changes to surrounding areas.

March 1993 (*scale 1" = 1,000')* – The Slag Processing Area is primarily unchanged (compared to April 1986) with the exception of SMWU 42 landfill appears to be capped. Increased vegetation is visible along Monroe Ditch. The ponds formerly visible east of Monroe Ditch are not visible. The Former Drainage Path (AOC 17) along the southern boundary of the area is still visible. Slag processing operations are ongoing and numerous small mounds of material are visible in the western portion of the area. Two paved slag-hauler roads and the skull cracker building are visible. A road has also been constructed along the southern and western sides of Mill Scale

Area 3 (AOC 13). There are no changes to the northeastern or southeastern portions of the Slag Processing Area and no changes to the surrounding area.

March 1999 (*scale 1" = 2,000')* – The Slag Processing Area is primarily unchanged (compared to 1993).

March 2007 (*scale 1" = 200')* – The Slag Processing Area is primarily unchanged (compared to 1999). It appears that quenching operations in the Kish Quenching Area (SWMU 49) had been modified by adding to the building structure. Additionally, a 500,000 gallon aboveground water storage tank is observed on the north side of the property. The tank was installed in 2003 as part of water management operations in the Slag Processing Area.

2.4.1.6 Additional Areas South of Oxford State Road

July 1938 (scale 1" = 1,320') – The Additional Areas consists of residential properties and undeveloped land. Surrounding properties are residential and undeveloped farmland. Due to the small scale of this photograph, individual properties cannot be identified.

March 1956 (*scale 1" = 800')* – The Additional Areas are primarily unchanged (compared to 1938). However, a building and associated circular drive is present on the Former Glenn Cartage Property (AA 02). Surrounding properties are the same with the exception of the AK Steel Melt Plant located to the northeast, which has been developed.

March 1961 (*scale 1" = 800')* – The Additional Areas and surrounding properties remain unchanged (compared to 1956).

August 1962 (*scale 1" = 660')* – The Additional Areas and surrounding properties remain unchanged (compared to 1961).

October 1968 (scale *1" = 660')* – The Additional Areas and surrounding properties remain unchanged (compared to 1962); however the following changes are noted. Dicks Creek appears to have been channellized by this time. The Sturgell Property (AA 03), is residential, however, the southern three-fourths of the property appears to have been disturbed. The remainder of Ormans Welding Property (AA 09) is now present. Pipeline Fill Area Adjacent to Station 36, along Oxford State Road (AA-08) is developed with two buildings and associated parking lots.

April 1976 (*scale 1" = 2,000')* – The Additional Areas and surrounding properties remain unchanged (compared to 1968); however, the 1976 photo depicts the southern portion of AA 02 as disturbed or perhaps covered with concrete. South of AA 02 and AA 09, a new facility is present as indicated by one small and one large structure, and associated drive.

March 1980 (*scale 1" = 1,000')* – The Additional Areas and surrounding properties are similar as compared to 1976. Increased commercial development appears in the area as larger structures are observed. Two circular areas of disturbance are present on the southern portion of AA 02. Immediately north of these parcels and Oxford State Road, a small pond is visible.

March 1986 (*scale 1" = 1,000')* – Conditions appear to be the same as 1980. No changes are noted.

March 1993 (*scale 1" = 1,000')* – The properties south of Oxford State Road are all now commercial or covered by large numbers of automobiles in a salvage yard, and is similar to present day conditions.

March 1999 (*scale 1" = 2,000')* – Conditions appear to be the same as 1993. No changes are noted.

March 2007 (*scale 1" = 200')* – Conditions appear to be the same as 1999. No changes are noted.

2.4.2 Sanborn Fire Insurance Maps

Historical site use was also evaluated by reviewing fire insurance maps. Fire insurance maps have been produced historically by private fire insurance companies. Coverage and copies of Sanborn Maps for the years 1912, 1921, 1924, 1931, 1950, and 1971 were available and reviewed. It should be noted that some unit operations labeled on the fire insurance maps are not consistent with operations at AK Steel. Copies of the Sanborns that are applicable to this facility are provided in Appendix B.

2.4.2.1 1912 Sanborn Map

The North Plant is depicted as The ARMCO East Plant in the 1912 fire insurance map. According to the Sanborn Map, the property uses steam heat and electric lighting. Fuel is obtained by coal, crude oil and natural gas. Buildings on the property are labeled individually as: storage and shipping department, warehouse, galvanizing, annealing (ovens), grease No., finishing building, jobbing mills, sheet mills, hot beds, steel construction, soaking pits, steel construction, coal handling plant, machine shop, pipe shop, carpenter shop, employment, and store. Three acid tanks are depicted outside of the pickling building. Other undefined tanks include three clarifier tanks located in the coal handling plant. Soaking pits and gas producers are observed on the western end of the Blooming Mill Building. Railroad spurs traverse the site, entering each building for deliveries and transport. Iron chimneys are first depicted at the site in this map. A stock yard and “skull cracker” are identified along the western portion of the site. Surrounding properties include the O.K. Paper Pail Company and Pollock & Kilgore Saw Mill. It is not clear if these properties are part of the present day site.

2.4.2.2 1921 Sanborn Map

Much of the North Plant Area layout and use remain the same; however, additions have been made. Buildings such as a main hall, hospital, a bank, bicycle sheds, dining hall and an employment office are now depicted. Other larger additions include a galvanizing building and finishing building on the northern edge of the site, north of the main warehouse building. A skull cracker is present west of the warehouse building. South of the warehouse building lies one building divided into three different areas which include: conveyor, scrubber, and cold rolls. East of this area are three oil tanks. An electric substation is now present and occupies a former pickling area. Several large transformers along with a gas producer and gas washer are located south of the Sheet Mill Building. Many of the buildings in the 1921 Sanborn Map are larger due to additions. The southern portion of the site now has a Forge Shop and machine shop. South of these buildings are two buildings labeled “oil storage and oil shed.” Two water tanks are shown on the southwest portion of the site, between two rail lines. Numerous rail spurs enter and exit the site.

2.4.2.3 1924 and 1931 Sanborn Maps

The North Plant Area is presented on the 1924 and 1931 Sanborn Maps. No changes were noted between the 1924 and 1931 Sanborn Maps, with the exception of added areas which include coil storage, coil shear, coil distribution and hot strip mill located on the southeast portion of the North Plant Area. These Sanborn Maps remain relatively unchanged from the 1921 Sanborn Map and depict the North Plant. One exception is the addition of a loading building and shipping and storage building that has been constructed and added on to the north side of the Galvanizing and Finishing Buildings on the northern edge of the site. Numerous tanks are located both within and outside of these major structures and include 5-8,000 gallon aboveground oil storage tanks located south of the loading building located on the far northern portion of the site. Three 6,000 gallon oil tanks are shown in the central portion of the site, north of the sheet mill building. Other undefined tanks include three iron tanks and two steel tanks located north of the coil shearers building.

2.4.2.4 1950 and 1971 Sanborn Maps

The North Plant Area is presented on the 1950 and 1971 Sanborn Maps. No changes were noted between the 1950 and 1971 Sanborn Maps. The North Plant Area is depicted as the ARMCO Steel Corp. in the 1950 and 1971 fire insurance maps. According to the Sanborn Maps the property uses electric and steam power and fuel is obtained by coal and oil. Water is obtained from wells and a motor driven centrifugal pump. A city water main is available for emergencies only. Buildings on the property are labeled individually as: offices, loading, shipping and storage, sanitizing, finishing, warehouse and storage, bicycle shed, employment office, gas producer (with soaking pits), dispensary, distributing, bluing furnace, black iron storage, furnace building, bar storage, picklers, universal bar mill, hot strip mill, open hearth furnace, open hearth stock yard, power house, roll shop, machine shop, forge shop, gas producers, welding shop, oil house, oil and acetylene storage, cold steel warehouse, strip mill, annealing, and conveyer buildings. A substation is depicted immediately south of the warehouse and storage building. The tanks identified in the 1924 and 1931 Sanborn Maps are still depicted in the 1950 and 1971 Sanborn Maps. Several oil houses, including oil and acetylene buildings are still noted on the northern edge of the site.

Adjacent properties to the east include the Packaging Corp. of America in 1971 and The Fairbanks Fiber Box Co. in 1950, while residential homes are located beyond. Residential properties are not depicted to the north, south and west in the 1950 and 1971 Sanborn Maps.

2.4.3 Facility Drawings

Facility drawings from selected areas were obtained from AK Steel. The drawings provide knowledge of the specific area including the age of the unit, operation process, and surrounding structures. In addition, a site map with the current buildings and surrounding structures is included as a reference. The facility drawings and the site map are included in Appendix C.

2.5 Facility, Operations, and Waste Management Practices

2.5.1 Facility

AK Steel (Middletown Works) manufactures steels, which includes carbon steel melting, casting, hot and cold rolling, and finishing operations. The main raw materials for steel making are iron ore, lime, limestone, and coal. This plant has one blast furnace, a coke plant (battery), two basic oxygen furnaces located in one building, one hot strip mill, one cold strip mill, pickling lines, hot dipped aluminized line, hot dipped galvanized line, zinc electrolytic lines, annealing furnaces, and temper mills . These facilities operate on or near continuous basis. With the same raw materials and the same processes, it is reasonable to expect that the waste generated on a day to day basis will be the same. Documented releases associated with SWMUs/HWMUs/AOCs are discussed in Section 2.6 and the unit data sheets presented in Appendix A.

2.5.2 Operations

Coke Ovens – Coal is converted to coke in a coke oven battery (two batteries shutdown in 1995). The coking process consists of heating coal in the absence of air to drive off the volatile compounds; the resulting coke is a hard, but porous carbon material that is used for reducing the iron in the blast furnace. The by-product coke oven recovers volatile chemicals in the form of coke oven gas, tars, and anhydrous ammonia.

Blast Furnace (B.F.) – Iron ore, sinter (prior to 2003), limestone and coke are combined in the furnace at controlled amounts, ratios and rates along with preheated air and natural gas. After many reactions at elevated temperatures, molten iron, slag and gas (CO and CO_2) and dust are generated. The iron and slag are tapped from the base of the furnace and the dust and gasses exit the top of the furnace. The operation is continuous. The large dust particles are collected in a dust catcher (B.F. Dust) and sent off-site for recycling or disposal. The remaining dust is removed from the gas via a wet scrubber. The water and solids are pumped to the B.F. settling basins. The solids settle out in the basin and the water is further treated and discharged through a National Pollutant Discharge Elimination System (NPDES) permitted outfall.

Water Softening – River water is treated with lime, ferric sulfate or sodium aluminate for hardness removal. Blow down slurry from the softening operations goes to the B.F. settling basins. The solids are removed from the B.F. settling basins (B.F. Sludge) using a dredge and filter press operation.

Basic Oxygen Furnace (BOF) – Molten iron from the B.F. is transported to the BOF where it is made into steel by injecting lime and magnesium oxide and then poured into the BOF processing vessel. Dust from desulfurize and pour processes are collected in a baghouse. Slag is then skimmed from the top of the ladle. Dust generated during deslagging is also collected in a baghouse. The molten steel is poured from the ladle into the slab caster. Dust generated during the process is sent through a wet scrubber gas cleaning system. The larger particles are dropped out of the water at the BOF classifiers and the finer fraction is settled out in BOF clarifiers. The solids are vacuum-filtered from the clarifier underflow and sent off-site for disposal.

Hot Strip Mill (HSM) – Hot steel slabs are rolled in several steps from a thickness of 9 inches down to 0.030 to 0.15 inches thick. High pressure water is used at each size reduction step to remove scale and cool the rolls. The water is discharged to the HSM clarification plant where solids are settled and precipitated with clarification aided by polymer addition. Solids are vacuum-filtered from the clarifier underflow. The larger particle size material settles out in the #1, #2, and #3 Scale Pits before reaching the clarification plant. The #1 and #2 Scale Pits receives water from the roughing mill. The #3 Scale Pit receives water and scale from the finishing mill (last size reduction steps at the HSM) and some of the roll grinding fines from the #2 Roll Shop.

Cold Strip Mill and Picklers – Hot rolled steel then passes through a hydrochloric acid bath (pickling) to remove surface scale. Waste acid is pumped to two storage tanks at the South Terminal Treatment Plant (STTP). Waste rinse waters are pumped to the STTP. Pickled steel is then routed to the Cold Strip Mill for further size reduction. An oil/water emulsion is used to cool and lubricate the strip and rolls during the rolling process. A portion of the rolling solution is also pumped to the STTP.

Electroplating – Zinc electroplating is performed at the #2 Electrogalvanizing Line (EGL). The acid and caustic waste water generated from strip steel cleaning prior to electroplating are pumped to the STTP. Zinc containing waste waters are pumped to the #2 EGL WWTP. The zinc wastewaters are generated from the plating process portion of the line. Caustic and polymers are added at the #2 EGL WWTP for precipitation and settling. The zinc filter cake from WWTP is typically sold as a product but may occasionally be disposed off-site.

The STTP treats wastewater from the Cold Strip Mill, Picklers, and acid/alkali wastewater from the #2 EGL. Lime, polymer, and a small stream of weak acid are added for solids precipitation and settling. SPL is used as a coagulant at the STTP. Solids are vacuum-filtered from the clarifier underflow.

Hot Dip Coating Operations – Before coating, the steel strip may be cleaned and prepared by both caustic cleaning and acid cleaning prior to dipping in the molten bath. Wastewaters from the hot dip galvanizing line are routed to the North Terminal Treatment Plant (NTTP). Another operation is the hot dip aluminum coating line (#4 Aluminize).

Concentrator Pit – The Concentrator Pit is a concrete collection point for miscellaneous plant wide aqueous inorganic wastes. Wastes are transported by tanker or vacuum truck to the basin. The water portion is processed by the NTTP and the settled solids are removed and sent off-site for disposal.

Stormwater/SPCC Ponds – Detention ponds are located at most of the plant storm water runoff discharge points. Solids accumulate in the ponds due to the solids carried by the runoff from the ground surface and raw material stock piles. Solids are occasionally removed from the ponds, approximately every two years.

Road Sweepings – Plant roads are swept as part of the fugitive dust emission reduction program. The material collected is primarily dirt and raw materials that is incidentally spilled or carried out of the storage areas on the tires of transportation vehicles.

Landfills – There are closed solid waste landfills located in the Slag Processing Area. The landfills consist of wastes associated with the operations at the Middletown Works. Upon closure, the landfills were regraded and capped with compacted low permeability clay and seeded. Currently, there are no active landfills.

2.5.3 Waste Management

AK Steel is classified as a large quantity generator. The hazardous waste (EPA ID Number OHD004234480) is accumulated on-site for less than 90 days, so no storage permit is required. All waste transported off-site goes to approved disposal facilities. SPL is injected in two on-site deep injections wells (HWMU 1 and HWMU 2), which are permitted by the Ohio EPA, Underground Injection Control rules. Ohio EPA conducts annual compliance evaluation inspections, which includes waste management practices at the facility. In addition, PCB power equipment (i.e., transformers, capacitors) were removed and replaced with non-PCB containing equipment by 2000 at the Middletown Works.

2.6 Facility Releases

There are reported spills or releases associated with operations at the plant. The majority of the releases were caused predominantly by equipment failure (i.e., piping, pumps). Each spill was promptly managed by applying mitigation controls (i.e., absorbent material) and remediation practices (i.e., excavation, liquid recovery, neutralization agent). Currently, AK Steel has a Spill Prevention, Control, and Countermeasure (SPCC) Plan. Best Management Practices are implemented throughout the operations of the plant, which includes procedures during emergency spills. In addition, the Ohio EPA and National Response Center are contacted, as required. The following sections describe the known major releases within the plant after reviewing readily available AK Steel records and interviewing AK Steel personnel.

2.6.1 Diesel Fuel Releases

There were two derailment incidents, where diesel fuel was inadvertently released from fuel storage tanks located on the locomotives, and a minor diesel fuel spill from a pump on an aboveground tank.

- Melt Plant Area - On November 11, 1992, approximately 2,500 gallons of diesel fuel was released from a leaking tank on the locomotive in Reeds Yard, located between the Melt Plant and South Plant Areas (Figure 1 of Appendix E-1). Recovery and remediation activities were immediately implemented by installing interceptor trenches on both sides of the rail track (one on the north side and two on the south side). Diesel fuel and water were periodically recovered by utilizing a vacuum truck. In addition, approximately 200 linear feet of track were removed, and subsequently the impacted ballast and soil beneath it. Approximately 539 tons of impacted ballast and soil were removed and transported to an off-site disposal facility. Due to a substantial rainfall event during the emergency response activities, approximately 15,000 gallons of liquids (diesel fuel and water) were recovered from the interceptor trenches. The recovered liquids were transported and recycled at an oil recovery unit inside the plant.

- North Plant Area - On June 10, 1995, two locomotives collided releasing approximately 5,000 gallons of diesel fuel on the ground between the Main and Yankee Road Gates (Figure 1 of Appendix E-1). Recovery and remediation activities were initiated immediately by removing impacted ballast stone and impacted soils. Subsequently, an interceptor trench with recovery piping was installed and diesel fuel was periodically recovered by utilizing a vacuum truck.

The interceptor trench was removed after no diesel fuel was observed after a period of time. The recovered diesel fuel was transported and recycled at oil recovery unit inside the plant, and the impacted soils were transported to an off-site disposal facility.

- North Plant Area - In the October 16, 2009 letter entitled *Consent Decree Case Number C-1-00530 EPA Disapproval of Current Conditions Report prepared for AK Steel by Arcadis,* U.S. EPA and Ohio EPA documented a minor diesel fuel release from a 500 gallon aboveground storage tank during the site visit in May 2008. In the letter, the U.S. EPA and Ohio EPA requested an evaluation of this release. The 500 gallon steel aboveground diesel tank is located between doors 082 and 083 on the west side of building 5317, and is staged on a paved surface (Figure 1 of Appendix E-1). The construction of the tank consists of steel with secondary containment with a rain shield. On March 10, 2008, less than one gallon of diesel fuel was released from the pump (located on top of the tank) during fueling operations. Upon the release, the pump was shut off and the spill was contained and recovered with absorbent material. Prior to restarting the fueling operations, the pump was replaced. The fueling operations in this area are inspected on a weekly basis.

2.6.2 Coke Oven Gas Pipeline Release

In January 1996, carbon monoxide was detected in two homes located on Ottawa Street, adjacent to the western boundary of the facility (Dames & Moore 1996). It was determined that a release of coke oven gas had occurred from a leak from the distribution pipeline (SWMU 44). The coke oven gas pipeline release is presented on Figure 2 of Appendix E-1. AK Steel isolated and removed the section of the pipeline and was temporarily abandoned until the line was removed from service in 2000.

Subsequently site investigation activities were implemented to assess the soil and groundwater conditions from the release area. The wells were installed in two saturated zones, one representing the shallow groundwater zone (total depth at approximately 15 feet below land surface [bls]) and the other representing the intermediate aquifer unit of the site (total depth at approximately 45 feet bls).

The coke oven gas pipeline release and the area of the former coke oven gas pipeline were determined to be the likely sources for the levels of benzene found in the groundwater. The occurrence and relative distribution of benzene, toluene, ethylbenzene and xylene (BTEX) compounds identified in the groundwater are consistent with their presence in coke oven gas within the pipeline. The results of this investigation indicated that benzene concentrations were present in the shallow groundwater zone both on-site and then off-site properties to the west of site property line. Levels of benzene at or below detection levels at six locations sampled by Dames & Moore and the Ohio EPA west of the former coke oven gas pipeline indicate that the extent of off-site impacts in the uppermost saturated zone (upper aquifer) extended 50 to 100 feet west of the plant property line (Dames & Moore 1996). The investigation report is presented in Appendix E-2.

On April 1996 through March 1998, corrective actions were implemented by installing a soil vapor extraction (SVE) system to remediate the shallow impacted soils. The system operated for approximately two years and remediated the impacted shallow soils, based on field and laboratory data.

To address the impacted groundwater in the shallow groundwater zone, a pump and treat system was installed in 1998. However, the operation of the groundwater treatment remedial system was limited due to severe drought conditions or limited recharging in the shallow groundwater zone.

To address the off-site properties that were impacted from the release, AK Steel purchased ten residential parcels to the west of the property line, and demolished the structures and converted the properties into a green belt area between 1997 and 1999. Furthermore, AK Steel removed, cleaned, and properly disposed piping and drip legs between 1999 and 2000.

In April 2000, August 2000, and May 2005, remediation of the shallow groundwater zone was implemented to address any remaining residual benzene concentrations in groundwater by injecting BIOX™ (an aerobic oxidizer) into existing monitoring wells and soil borings (Shaw Environmental Inc. 2005).

Based on the monitoring data from the last sampling event in August 2007, benzene concentrations were below laboratory detection levels from the monitoring network from sampling events in 2005, 2006, and 2007 (ARCADIS, Inc. 2008).

2.6.3 Coke Flushing Liquor Releases

There were five major flushing liquor releases reported in the general area of the Stormwater Sump (AOC 6) and the Former Coal Tar Decanter Sludge Collection Bin recycling area (SWMU 16) in the Melt Plant Area. Flushing liquor is a solution composed of water, ammonia, and organics that is generated as a by-product during the coking process. The approximate location of the flushing liquor releases are presented on Figure 3 of Appendix E-1. A brief summary of the five releases are presented below:

- May 10, 1991 - Approximately 25,000 gallons of flushing liquor were released from an aboveground pipe adjacent to the two still primary coolers. The predominant flow of the release was southeast toward the Stormwater Sump (AOC 6), which is approximately 100 linear feet. The majority of the spilled flushing liquor was recovered in the sump and returned to the coke by-products operations. Supplemental recovery activities were initiated by utilizing a vacuum truck in the areas that did not enter the sump (AOC 6).

- July 9, 1991 - Approximately 50,000 gallons of flushing liquor were released at the Wilputte flushing liquor decanter. The release area was in the same locality as the May 1991 release area. Similar to the May 1991 release, most of the spilled flushing liquor was recovered in the Stormwater Sump (AOC 6), and vacuum trucks recovered any remaining flushing liquor that did not enter the sump. The recovered flushing liquor was returned to the coke by-products operations.

- June 26, 1992 - Approximately 50,000 gallons of flushing liquor were released from the heavy tar boxes, located near the Former Coal Tar Decanter Sludge Collection Bin (SWMU 16). This released overlapped the May and June 1991 release areas and most of the spilled flushing liquor was recovered in the sump (AOC 6). Vacuum trucks recovered any remaining flushing liquor that did not enter the sump (AOC 6), and was returned to the coke by-products operations.

- July 26, 1995 - Approximately, 9,500 gallons of flushing liquor were released at the Number 2 Still Battery pusher pad area. Most of the flushing liquor was contained at the concrete push pad; but an unknown amount entered the underground storm sewer system, which ultimately discharged into Dicks Creek from Outfall 003 and resulted in a reported fish kill. AK Steel implemented corrective action by (1) sealing all drain holes and dewatering manholes along the pusher rail, (2) installing containment curbs at the ends of the pusher pads, (3) sealing the two storm drains south of the pusher pad (connecting to Outfall 003), (4) plugging the quench sump basin overflow (connecting to Outfall 003), (5) installing containment curbs around the stack askania pits, and sealing the storm sewer manhole cover at the southeast end of the pusher pad. The recovered flushing liquor was returned to the coke by-products operations.

- December 19, 2002 - Approximately 25 gallons of flushing liquor were released from corroded drain valve on the deactified ammonia water pre-cooler. The flushing liquor was recovered by utilizing a vacuum truck and the flushing liquor was returned into the coke by-products operations. It was estimated that five gallons of flushing liquor entered Outfall 002 then ultimately discharged into Dicks Creek. No discoloration or fish kills were reported in Dicks Creek. The recovered flushing liquor was returned to the coke by-products operations.

2.6.4 Spent Pickle Liquor Releases

There were 11 spent pickle liquor (SPL) releases associated with the aboveground pipeline from the pickler building (building number 6021) to the Spent Pickle Liquor Tank Farm (SWMU 33) located in the South Plant Area. The SPL is conveyed through the Spent Pickle Liquor Filtration System (SWMU 34) and is transported via aboveground piping to the two permitted deep injection wells (HWMU 1 and HWMU 2). SPL is a listed hazardous waste K062, which is composed of a solution of ferrous chloride (9 to 27 percent) and hydrochloric acid (1 to 5 percent).

Most of the releases were caused by the malfunctioning expansion joints on the aboveground piping between the pickler building and the SPL tank farm (approximately 923 linear feet). The expansion joint is a rubber type material with pleated bellows that is attached to the pipe flanges between pipe sections. AK Steel contacted the manufacturer of the failure problems of the expansion joints, but no remedy was resolved.

During each spill incident, the free liquids of SPL were recovered by utilizing a vacuum truck(s), and treating the impacted soil by mixing soda ash and lime to neutralize (stabilizing the pH), prior to disposal. Field test samples, including pH samples, were collected to assure the soils were properly treated, and then soil samples were collected for waste characterization analysis. Based on the analytical results, the soils were appropriately disposed. In 1998, the piping was upgraded to double wall piping and no releases have been reported since the upgrades were completed. The approximate SPL release locations are presented on Figure 4 of Appendix E-1.

A brief summary of the 11 releases are presented below:

- February 25, 1991 - Approximately 200 gallons of SPL were released from a failed expansion joint from aboveground piping between the pickler building (building 6021) and hot rolled processing building (building 6147). Upon locating the release area, the SPL line was shutdown and the ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soils. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after replacing the expansion joint.

- December 9, 1991 - Approximately 230 gallons of SPL were released from a failed expansion joint from the aboveground piping near the pickler building (building 6021). Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after replacing the expansion joint.

- February 16, 1993 - Approximately 3,800 gallons of SPL were released from a piping manifold at Injection Well #1(HWMU 2), and entered a drainage swale. Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the swale and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after repairing the piping manifold.

- August 4, 1993 - Approximately 150 gallons of SPL were released from a failed expansion joint from the aboveground piping near the pickler building (building 6021). Upon locating the release area, the SPL operations of the piping were shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after replacing the expansion joint.

- January 12, 1994 - Approximately 125 gallons of SPL were released from a failed expansion joint from the aboveground piping near the pickler building (building 6021). Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after replacing the expansion joint.

- January 11, 1996 - Approximately 300 gallons of SPL were released from a failed expansion joint from the aboveground piping near the pickler building (building 6021). Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after replacing the expansion joint.

- August 10, 1996 - Approximately 150 gallons of SPL were released from a failed expansion joint from the aboveground piping near the pickler building (building 6021). Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after replacing the expansion joint.

- October 18, 1996 - Approximately 100 gallons of SPL were released from a small hole in the aboveground piping north of the hot rolling processing building (building 6147). Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after repairing the line.

- April 21, 1997 - Approximately 500 gallons of SPL were released from a failed expansion joint from the aboveground piping near north hot rolling processing building (building 6147). Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. Discoloration was observed in Dicks Creek the following day (April 22, 1997). The source of the discoloration was later determined to be entering Outfall 004 from a drainage ditch near the release area. Corrective actions were completed including installing a dam(s) in the drainage ditch between the release area and Outfall 004, and recovering SPL free liquids. Surface water monitoring of Dicks Creek between Outfalls 004 and 002 continued when the SPL line was returned to service after replacing the expansion joint.

- January 26, 1998 - Approximately 150 gallons of SPL were released from aboveground piping near Injection Well #1(HWMU 2) and spilled around the injection well building. Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after repairing the piping manifold.

- March 3, 1998 - Approximately 200 gallons of SPL were released from the piping manifold at Injection Well #2 (HWMU 1). Upon locating the release area, the SPL line was shutdown and the free liquids were contained in the ditch and recovered by vacuum truck(s). The ground surface (shallow soils) was treated by adding lime and soda ash to neutralize the acidic solution adhered to the soil. The pH of the soils was routinely checked and the treated soils were removed for disposal. The SPL line was returned to service after repairing the piping manifold.

2.7 Environmental Permits

The following section lists the known permits at Middletown Works after reviewing readily available AK Steel records and interviewing AK Steel personnel:

- Clean Air Act Title V- Permit Number 14090100006. In 1994, there were 91 separate air permits representing the operations at Middletown Works. In 1996, AK Steel submitted Title V permit applications to consolidate their air permits into one. After three more submittals of the air application, a Title V Permit Number 14090100006 was issued to AK Steel by the Ohio EPA in 2005. A summary of the inactive permits are presented on Table 1 of Appendix E-3.

- NPDES Permit Number 1ID00001*LD – This permit covers the outfalls along Dicks Creek and the Great Miami River. There are six permitted outfalls (002, 003, 004, 008, 009, and 015) to Dicks Creek and one permitted outfall (011) to the Great Miami River. Outfalls 003, 004, 011, and 015 are currently the only outfalls that discharge treated process water. The remaining outfalls (002, 008, and 009) discharge storm water runoff, non-contacting cooling water, river water, and well water. There were a few previous versions of NPDES permits starting in 1987 that have since expired. A summary of the active and inactive permits are presented on Table 2 of Appendix E-3.

- Publicly owned treatment works (POTW) Permit Number 100-2010 – This permit was obtained from the City of Middletown for discharging wastewaters associated with the coking operations at Middletown Works. There were several previous versions of POTW permits starting in 1992 that have since expired. A summary of the active and inactive permits are presented on Table 2 of Appendix E-3.

- Underground Injection Control (UIC) Permit Numbers 0509001PTOI and 0509002PTOI – These permits cover the injection of spent pickle liquor into the two subsurface deep wells located in the South Plant Area. There were several permits that have since expired. A summary of the active and inactive permits are presented on Table 2 of Appendix E-3.

- Interim Measures- There are several permit applications submitted and permits approved by Ohio EPA, United States Army Corps of Engineers, and Norfolk Southern Railroad. A summary of the Interim Measure permit packages are presented on Table 3 of Appendix E-3.

2.8 Past Enforcements

The following section lists the known past enforcements at Middletown Works after reviewing readily available AK Steel records and interviewing AK Steel personnel:

- In March 1979, a consent decree was filed between ARMCO and U.S. EPA, regarding the implementation of air pollution control devices at Middletown Works. These included the operations associated with the coke plant, BOF, blast furnace, and the open hearth furnace. As a result, AK Steel developed a specific fugitive dust control program, known as the “Bubble” demonstration, which included a reduction of vehicular traffic (intra-plant bus transportation for employees), cleaning roads, installing vegetative barriers (green belts), and installing spraying systems for coal and storage areas. All requirements of the consent decree were met.

- In November 1989, a consent agreement was filed between ARMCO Steel Company, L.P. and U.S. EPA regarding NPDES permit violations. All requirements of the consent agreement were met.

- In December 1995, a consent order was filed between AK Steel and the State of Ohio, regarding the air emissions on still coke oven battery (Number 3 Coke Plant) at Middletown Works. AK Steel was required to monitor and report the emissions at the charging operations, off-take piping, charging hole lids, and oven doors. The operations of the still coke oven battery ceased in December 1995. All requirements of the consent order were met.

- In August 2000, the U.S. EPA issued an Administrative Order for subsurface investigation in the Slag Processing Area. The details of work completed for this order are presented in Section 3.1.1.8.

- In March 2004, a consent agreement decree was filed between AK Steel and Ohio EPA regarding the public nuisance claims related with operations at Middletown Works. This included installing pollution control devices on the blast furnace and the BOF to meet the maximum achievable control measure (MACT) standards. In addition, a telephone response program was established for concerned residents that believed they may have been affected by fugitive dust emissions. Further, AK Steel expanded the green belt by planting additional trees between the coking operations and residents near Oneida neighborhood. All requirements of the consent decree were met.

3. Preliminary Assessment of Nature and Extent of Contamination and Preliminary Site Conceptual Model

The following section presents the preliminary assessment of nature and extent of contamination and the preliminary site conceptual model, pursuant to Attachment 2 RFI/CMS SOW of the Consent Decree.

3.1 Preliminary Assessment of Nature and Extent of Contamination

The following section includes a summary of previous investigations completed, and identification of the associated data quality objectives (DQOs) from selected investigations. The data from the selected investigations will then be compared to the U.S. EPA regional screening levels (RSLs).

3.1.1 Description of Previous Investigations

Several investigations have been conducted at the Middletown Works, some of which were associated with areas that have been identified as SWMUs, HWMUs, AOCs, and AAs (Figures 1 and 2). The materials managed, environmental releases, previous investigations, and data gaps are summarized in Appendix A. In addition, groundwater investigations have been conducted and several are still ongoing. Previous investigations and ongoing remediation and groundwater monitoring programs are summarized in this section and supporting historical data are presented in Appendix E.

3.1.1.1 Investigation of Groundwater Flow Conditions

In 1987, an investigation was conducted to assess groundwater flow and quality beneath the site and the surrounding areas (Geraghty & Miller, Inc. 1989). During the field work phase, 46 shallow and 11 deep monitoring wells were installed and used for water-level collection and sampling for water quality (Section 3.1.1.2). The production well pumping schedule was also evaluated concurrently with the collection of site-wide water level measurements. Lithologic information, pumping data, and plant-wide and regional water-level data were used to create a three-dimensional groundwater flow model to assist with the evaluation of groundwater flow conditions. A copy of the report was submitted to Ohio EPA.

In 1989, AK Steel began a voluntary program to contain groundwater on-site by modifying the operation of the existing groundwater production wells. The current groundwater pumping scenarios used to maintain on-site groundwater capture are discussed in Section 3.2.4. Updates to and recalibration of the groundwater flow model were completed subsequent to 1989. The current understanding of geology, groundwater flow conditions, and capture is presented in Sections 3.2.2 through 3.2.4.

3.1.1.2 Groundwater Quality Investigations 1989 to 1990

As part of the groundwater investigation begun in 1987 to assess groundwater conditions within and at the boundaries of the plant (Section 3.1.1.1), the groundwater quality was also evaluated in 1989 and 1990 (Geraghty & Miller, Inc. 1990a). The purpose of the groundwater sampling was to determine groundwater quality primarily at the boundaries of the plant for the upper, intermediate and lower aquifers. Analytical data and groundwater flow maps are presented in Appendix E-5. Several metals and volatile organic compounds (VOCs) were detected in groundwater samples. Primarily this included detections of benzene in GM-4S and trichloroethene (TCE) in GM-27S. High pH values were measured in a few wells and were attributed to the presence of slag deposits in the vicinity of the affected wells. A copy of the report from this investigation was submitted to Ohio EPA. Additional discussion on current groundwater quality is presented in Section 3.2.5.

3.1.1.3 Site-Wide Groundwater Monitoring

In 1987 and 1988, ARMCO (presently AK Steel) conducted a groundwater investigation by installing sixty-four monitoring wells in the upper, intermediate, and deep aquifers to define the groundwater quality and groundwater flow conditions at the site. The well locations were installed predominantly around the perimeter of the plant including the Slag Processing Area (Geraghty and Miller, Inc. 1990a).

In 1989 and 1990, quarterly groundwater sampling events were implemented by collecting groundwater level measurements from all the monitoring wells and ten productions wells. Thirty-three monitoring wells were sampled by removing three well volumes and collecting field parameters (pH, temperature, and conductivity) from each well volume. Groundwater samples were submitted for laboratory analysis of sulfate, phenols, total dissolved solids, total Kjeldahl nitrogen, and VOCs (Geraghty and Miller, Inc. 1990b).

Since 1992, semi-annual groundwater monitoring events were initiated by collecting groundwater level measurements from the monitoring well network and the production wells. Groundwater samples were collected from selected monitoring wells during the first event of each year and submitted for laboratory analysis for VOCs. Only groundwater level measurements are collected during the second event. Semi-annual reports are submitted to the Ohio EPA, which includes the site wide groundwater pumping data from AK Steel's production wells, groundwater flow maps from each aquifer, and groundwater quality data (first event only). Specifically, the report demonstrates that groundwater pumped from the production wells beneath the plant is creating a capture zone in the intermediate and lower aquifer units, and part of the upper aquifer unit in the South Plant Area.

Groundwater quality data are collected on an annual schedule of 26 selected wells in the plant-wide monitoring well network and are submitted to characterize groundwater quality in the upper, intermediate and lower aquifer units beneath the plant. Historically, VOC constituents were detected in well GM-27S (TCE Plume), located in the North Plant Area and in a series of wells in the Melt Plant Area associated with the coke oven gas release (SWMU 44). Analytical data from 1995-2009 are presented in Appendix E-5. For the most recent Site-wide Groundwater Pumping, Flow and Quality Report (January through June, 2009), the following was stated for groundwater quality:

The only VOC detected in any of the groundwater samples was TCE. TCE was detected at a concentration of 440 micrograms per liter (µg/L) in well GM-27S (TCE Plume), which is located in the northwest corner of the plant near production well 38. GM-27S is screened in the intermediate aquifer in the North Plant Area. The groundwater flow map of the intermediate aquifer (Appendix E-5, *Intermediate Aquifer, April 2009*) indicates that pumping from plant production wells has created depressed water levels in the North Plant Area, causing groundwater in the intermediate aquifer to be drawn into the North Plant Area from off-site areas to the north and northwest.

The last groundwater monitoring event was completed in October 2009, and the results are discussed in Section 3.2.5 and presented in Appendix E-5.

3.1.1.4 Benzene in Groundwater Investigation

Benzene was first detected in the monitoring well GM-4S in 1989 during a quarterly groundwater sampling event (AOC 8). A two-phased groundwater investigation was conducted in 1991 and 1992 to delineate the extent of benzene in shallow groundwater (Geraghty & Miller, Inc. 1992). Likely historical releases from the coal tar storage tanks (AOC 2) were determined to be the most probable source of benzene in shallow groundwater in the vicinity of GM-4S. Analytical data, cross sections, and groundwater flow maps are presented in Appendix E-6. During Phase 1 four monitoring wells (GM-50S, GM-51S, GM-52S, GM-53S) were installed on-site and during Phase 2 three monitoring wells were installed off-site (GM-54S, GM-55S, GM-56S). An evaluation of biological attenuation of the benzene release area was conducted to assess the level of intrinsic biological attenuation occurring within the upper aquifer (Geraghty & Miller, Inc. 1997). Biogeochemical data was collected during the March 1995 and June 1997 sampling events. A review of this data indicated that biodegradation was occurring as evidenced by the decrease of benzene concentrations. During this investigation, Ohio EPA was involved in the development of the work plan, and copies of the submittals were sent to Ohio EPA. These wells are monitored on an annual basis (Section 3.1.1.3). Since 2001, benzene has not been detected in any of these wells (Appendix E-5).

3.1.1.5 Coke Oven Gas Pipeline Release Investigation

The site investigation and corrective action activities implemented for the Coke Oven Gas Pipeline and Release Area (SWMU 44) are discussed in Section 2.6.2. Dames and Moore, ENSR, Shaw, and ARCADIS were the environmental consultants that completed technical services related to the coke of oven gas pipeline release. Copies of the reports were sent to the Ohio EPA. Analytical data and groundwater flow maps from these remedial activities are presented in Appendix E-2.

3.1.1.6 Robin Hood Coal Pile RCRA Closure

Applications of recycled coal tar decanter sludge (TDS) to the eastern side of the Robin Coal Pile operated from 1983 to February 1990. TDS, an EPA listed waste K087, is a by-product from the coke operations and was mixed with high volatile (Vol) coal (Robin Hood Coal Pile). The treated coal was loaded onto a conveyor and was processed through the coke ovens. During an Ohio EPA inspection in 1989, a notice of violation (NOV) was issued to AK Steel for the management operations of the TDS. As a result of the NOV, AK Steel ceased applying TDS to the coal pile on February 23, 1990, and began using a contractor to manage the TDS at the former coal tar decanter sludge recycling area (SWMU 15) to maintain compliance with Ohio EPA and U.S. EPA regulations.

Prior to the Robin Hood Coal storage area, the foot print of the tar lagoons were present beneath much of the eastern end of the coal pile. The operations of the tar lagoons were observed in the aerial photographs between March 1956 and June 1966. The tar lagoons were absent in the 1968 aerial photographs; therefore, it was concluded the tar lagoons were removed and converted into a coal storage area. To address the residual tar from the former tar ponds, approximately 6,360 cubic yards of impacted soil was excavated and transported for off-site disposal. The excavation encompassed both former tar ponds, except the north section (approximately 3,843 square feet) of the former northeast pond, due to access restrictions because this section was beneath a plant access road.

Pursuant to Ohio EPA regulations (OAC 3745-55-10), the closure plan for the former Robin Hood Coal Pile was approved on August 12, 1998. The closure plan field activities were implemented between 1998 and 2000, which included the collection of background samples, grid sampling (release verification soil sampling, excavation), off-site disposal, and closure verification soil sampling (Cox-Colvin & Associates, Inc., 2000). The closure plan included the installation of five monitoring wells in the upper aquifer. The upper aquifer in this area is typically “dry” from site wide pumping from the production wells. Based on the “dry” conditions of the upper aquifer, the Ohio EPA approved that no wells need to be installed if groundwater was not encountered by 20 feet bls.

Background and grid sampling was completed during three field events by utilizing a drilling rig in October/November 1998, April 1999, and July 1999. At the designated boreholes for proposed monitoring wells, no groundwater was encountered at 20 feet bls; therefore, no wells were installed. After the completion of the field activities, background statistical limits were established for VOCs, SVOCs, and metals. Based on the release verification (grid sampling) soil sampling results, benzene and toluene exceeded background statistical limits for sample RHSB-12.

Prior to soil excavation, the active coal pile was relocated and on March 13, 2000, the coal base was removed down to the coal/soil interface. Over-excavation activities (10ft long x10ft wide x7.5ft depth) were completed at sample location RHSB-12 and closure verification samples (VS-01 through VS-04) were collected. Laboratory analytical results indicated that benzene concentrations exceeded the statistical limits from all the samples. On May 23, 2000, the aforementioned excavation footprint increased to 12 ft longx12 ft widex11.5 ft depth) and verification samples (VS-05 through VS-08) were collected and submitted to the laboratory for analysis. Analytical results indicated that benzene concentrations exceeded in VS-06. On May 28, 2000, more soil was removed in the vicinity of VS-06, which included increasing the original excavation an additional five feet deep and extra foot on the west and south excavation walls. One verification sample was collected (VS-09) and submitted to the laboratory for analysis. Analytical results indicated that that all analytes were below the statistical limits or closure standards (Cox-Colvin & Associates, Inc., 2000).

Approximately 90 cubic yards of soils were placed in roll off containers and transported to an off-site disposal. On May 19, 2000, AK Steel submitted the Closure Certification report to Ohio EPA and received closure approval in a correspondence letter, dated June 13, 2000 (Ohio EPA 2000). The text, tables and figures of the Closure Report are included in Appendix E-7. The Robin Hood Coal Pile RCRA Closure is further discussed in Appendix A and Sections 4, 5 and 6.

3.1.1.7 TCE Groundwater Investigation

In 1997, an investigation was conducted to determine whether the source of TCE in monitoring well GM-27S was associated with main operations in the North Plant Area (ARCADIS Geraghty & Miller, Inc. 1998). Analytical results, cross sections, and maps of the potentiometric surface are presented in Appendix E-8. A copy of the report was submitted to Ohio EPA. Historical information indicated that there were no AK Steel activities west or north of the North Plant. Monitoring well GM-27S is screened in the intermediate aquifer and TCE concentrations have ranged from 110 microgram per liter (ug/L) in June 1997 to 940 ug/L in March 1996.

Continued monitoring of this well and the zone of capture created by production well pumping is discussed in Section 3.2.5 and 3.2.3, respectively.

3.1.1.8 Slag Processing Area Investigations

In 1988, monitoring wells GM-30S, GM-30D, GM-35S, GM-36S, GM45S, GM-46, and GM-46D) were installed in the Slag Processing Area (west side of Slag Haul Road) as part of the site wide groundwater flow conditions study (Geraghty & Miller, Inc. 1989). In 1997, GM-46S was replaced with GM-46R.

In 1995, the Ohio EPA collected sediment samples in Dicks Creek, where polychlorinated biphenyls (PCBs) were detected in selected sample locations.

In 1997, groundwater seeps on the eastern bank of Monroe Ditch were identified near the Slag Processing Area. Corrective measures were initiated by installation of a groundwater interception trench system, temporarily. The trench was excavated until a confining layer was encountered, a liner was installed at the bottom and downgradient side of the trench, perforated piping and a recovery sump were installed and the trench was backfilled with gravel (ARCADIS, Inc. 2002a). Groundwater enters the trench and gravity-flows to the trench sump, where it is pumped through two carbon vessels for treatment. The treated groundwater is pumped through an aboveground hose to an aboveground tank located approximately 1,000 feet northeast of the trench for use in the Slag Processing Area. Weekly samples are collected from the influent piping, the piping between the carbon vessels, and the effluent piping. In 1999, the system was modified by extending the perforated screen laterals further south along Monroe Ditch. Subsequent monitoring reports were submitted to the Ohio EPA.

In addition, seven suspected PCB containing transformers were identified in the Slag Processing Area, where shallow soil samples were collected at each location. PCBs were detected at low concentrations in two locations, one at Mill Scale Area 1 (AOC 11) and the other at Mill Scale Area 2 (AOC 12).

Based upon the PCBs identified in the groundwater seeps and at the transformer locations, an assessment of the Slag Processing Area was implemented. This included interviewing AK Steel personnel, reviewing available aerial photographs, and evaluating the laboratory reports from previous investigations. Ten potential PCB sources were identified in the Slag Processing Area: (1) Air Compressor Building, (2) Oil Storage Area (SWMU 46), (3) Air Dump Area, (4) Former Ponds West of Monroe Ditch (SWMU 39), (5) Former Oil Separator Ponds Area Southeast of the Slag Processing Operations Area (SWMU 47), (6) Mineral Oil Transformers (AOC 16), (7) Former Drainage Path along the Southern Boundary of the Slag Processing Area (AOC 17), (8) Mill Scale Area 1 (AOC 11), (9) Mill Scale Area 2 (AOC 12), and (10) Mill Scale Area 3 (AOC 13).

From June 1998 through September 2000, four investigations were completed to determine the presence of PCBs in the aforementioned 10 potential sources. The investigations included collecting soil and groundwater from soil borings and monitoring wells, respectively. Sediment samples were also collected in Dicks Creek, Shaker Creek, and Monroe Ditch. A description and findings of the four investigations are presented in the 1999 *Monroe Ditch Investigation First Interim Report* and the 2001 *Soil and Groundwater Work Plan* (ARCADIS, Inc. 2002a), which were submitted to the Ohio EPA. The summary of the investigations are briefly discussed below:

- Investigation 1 – This investigation was completed from June through July 1998, where soil borings (BH01 through BH025), and shallow soil borings (SS01 through SS06), and (SD01 through SD11) were advanced. In addition, selected soil borings were converted to monitoring wells (MDA-01 through MDA-25). In addition, four well points were installed along Monroe Ditch. This investigation identified the Former Drainage Ditch along the southern boundary (AOC 17) of the Slag Processing Area and Mill Scale 3 (AOC 13) as PCB sources.

- Investigation 2 – This investigation was completed from October through November 1998, where soil samples were collected from the Former Drainage Path (AOC 17) and Mill Scale 3 (AOC 13) Areas.

- Investigation 3 – This investigation was completed from March through April 1999, where sediment samples were collected in Dicks Creek, Shaker Creek, and Monroe Ditch.

- Investigation 4 – This investigation was completed from August through September 2000, where additional soil borings were advanced in the Former Drainage (AOC 17) and Mill Scale 3 (AOC 13) Areas. In addition, monitoring wells MDA-26 through MDA-28 were installed on the northern portion of the Slag Processing Area, to better understand the groundwater flow conditions. Based upon the findings of this investigation, the *Soil and Groundwater Investigation Plan* was developed.

In August 2000, the U.S. EPA issued an Administrative Order pursuant to Section 7003(a) of the RCRA, 42 United States Code 69739(a), Docket No. R7003-5-00-002. The Administrative Order outlined the scope of work in the Slag Processing Area, based upon the 2001 *Soil and Groundwater Investigation Plan.* The scope of work included investigating the hydrogeology, soil quality, groundwater quality, and groundwater interaction with the surface water receptors in the Slag Processing Area.

From July through December 2001, forty soil borings and thirteen monitoring wells were installed. In addition, two groundwater sampling events were completed, one a baseline groundwater sampling event and the other a supplemental groundwater sampling event (after the new wells were installed). Furthermore, well points and stream gauges were installed in Monroe Ditch and Dicks Creek, and hydraulic conductivity testing was completed on selected wells. Based upon the findings, a conceptual hydrogeologic and transport model was developed.

Soil samples were analyzed for total PCBs, polynuclear aromatic hydrocarbons (PAHs), and metals. In shallow soils (less than 2 feet), total PCBs were detected in thirty-four of the seventy-two surface soil samples analyzed. However, only three surficial soil samples contained PCB concentrations in excess of 10 milligrams per kilogram (mg/kg), which is lower risk-based screening-level in U.S. EPA Guidance for Remedial Actions with PCB Contamination (U.S. EPA, 1990). No elevated concentrations of PAHs and metals were present in the shallow soil samples. In deeper soils, total PCBs were detected in eighty-five of the one hundred fifty-five samples analyzed. Thirteen samples exceeded the U.S. EPA risk-based screening level of 25 mg/kg (U.S. EPA 1990). No elevated concentrations of PAHs and metals were present in the deeper soil samples.

Groundwater samples were collected from the perched zone and upper aquifer monitoring wells and analyzed for PCBs, PCB homologues, PAHs, and dissolved metals.

The *Soil and Groundwater Investigation Report, Volume I and II* were submitted to the U.S. EPA in 2002 (ARCADIS, Inc. 2002a). Laboratory analytical results from the aforementioned investigations are presented in the Appendix E-9.

3.1.1.9 USDW-01 Groundwater Monitoring

In 1993, AK Steel installed a lowermost underground source of drinking water (USDW) well (USDW-01) in the vicinity of the two class I injection wells located in the South Plant Area. The deep injection wells are permitted through the Underground Injection Control (UIC) sector of the Ohio EPA. SPL from steel operations is pumped into the two permitted injection wells which were installed to a depth of approximately 3,000 feet bls. The injection of SPL has been in operation since 1969 and is currently active. As required by the Ohio EPA UIC Permit, monitoring well USDW-01 was installed for the purpose of monitoring groundwater quality in the deep portion of the upper drinking water source. During drilling, bedrock was encountered at a depth of approximately 43 feet bls and the boring was advanced to 48 feet bls, where the well was set. Upon completion, the well was developed and sampled. The installation, development, and sampling of well USDW-01 were followed by the approved *Plan for Monitoring of the Lowermost USDW, ARMCO Steel Company, L.P., Middletown, Ohio (*ENVIROCORP 1993*).*

In 1994, groundwater samples were collected each quarter from monitoring well USDW-01. Laboratory analytical data from the sampling events was used to establish a baseline. The baseline results would then be used in comparison with subsequent groundwater sampling events.

Since 1995, groundwater samples have been collected from monitoring well USDW-01 semi-annually and submitted for laboratory analysis for pH, hardness, specific conductance, total solids, alkalinity, chloride, sulfate, and dissolved metals. In addition, groundwater parameters are collected in the field for pH, temperature, and specific conductance. A summary report using statistical modeling (probability plots and control charts) is submitted to the Ohio EPA after each sampling event. The groundwater monitoring plan is currently being implemented. Supporting data for the USDW is presented in Appendix E-10.

3.1.1.10 Landfill 1 Detection Groundwater Monitoring

The closed solid waste landfill (Landfill 1) (SWMU 43) consists of an un-lined cell that comprises approximately 28 acres. The wastes arrived from within the Middletown Works by rail. Landfill 1 is classified as a Class III residual waste landfill and therefore, is regulated under a groundwater monitoring program pursuit to the OAC 3745-30-08.

A closure plan for capping Landfill 1 was submitted in 1997. The cover system contains the following components, in ascending order:

- intermediate cover layer,
- recompacted clay barrier layer,
- synthetic membrane barrier layer,
- drainage layer,
- protective cover layer, and
- vegetative layer.

AK Steel inspects and maintains the cover system and surrounding erosion controls, and Landfill 1 is inspected by the Ohio EPA annually.

The approved groundwater monitoring program for Landfill 1 includes collecting groundwater samples from the upper aquifer monitoring wells (MW-1S, MW-3S, GM-28S, GM-31S, GM-62S, GM-65S, and GM-66S) semi-annually. During the first sampling event, groundwater samples are analyzed for total dissolved solids, total organic carbon, sulfate, chloride, chemical oxygen demand, ammonia, turbidity, gross alpha, gross beta, and metals. During the second sampling event, groundwater samples are only analyzed for total dissolved solids and total organic carbon. Groundwater field parameters (pH, temperature, and specific conductance) are collected from both events.

After every sampling event, a statistical evaluation report is submitted to the Ohio EPA. The statistical evaluation report compares the groundwater quality (field parameters and laboratory analytical parameters) from the up gradient wells and down gradient wells of the landfill. In addition, groundwater samples from monitoring wells MW-3S, MW-5S, GM-28S, GM-28D, and GM-33S are sampled for VOCs annually. No VOCs were detected from the aforementioned wells during the period from 1992 to 2009. Supporting data is presented in Appendix E-11.

3.1.1.11 Seep Remediation Measures

Concerns were first raised regarding PCBs in Dicks Creek in 1995 after the Ohio EPA identified PCBs in specific sediment samples collected in Dicks Creek (Ohio EPA 1997). Certain samples subsequently collected by Ohio EPA from groundwater seeps entering Monroe Ditch were analyzed in November 1997 and demonstrated the presence of PCBs. Monroe Ditch is a small tributary of Dicks Creek located within the Slag Processing Area. A groundwater interceptor trench system was installed by AK Steel along the eastern bank of Monroe Ditch to control these seeps. The interceptor trench was completed in mid-January of 1998 and in 1999 was extended to intercept an additional seep. Carbon absorption technology is used to remove PCBs from groundwater collected from the interceptor trench prior to re-use of the collected water in the Slag Processing Area.

The *Soil and Groundwater Investigation Report* (ARCADIS, Inc. 2002a) provides a detailed description of historical operations and potential sources of PCBs in the slag processing area. In brief, PCBs are present due to the historical use of PCB-containing oils in equipment used at the plant. Three former oil separator ponds located in the slag processing area were found to contain PCBs and were closed in accordance with Ohio EPA requirements circa 1983. PCBs have since been detected in soil at some locations in the area.

A seep inspection and analysis program was implemented in 2000 to identify and characterize groundwater seeps flowing from the Slag Processing Area into Monroe Ditch and Dicks Creek. A total of 42 seeps were identified over time. These included 36 seeps along Dicks Creek, generally located upstream (east) of AK Steel Outfall 002 as well as six seeps along Monroe Ditch. The pH of the groundwater seeps ranged from 6.9 (i.e., essentially neutral) to 12.4 (i.e., alkaline). Five of the analyzed seeps were found to contain detectable concentrations of PCBs; these seeps were clustered in two areas, one area along the bank of Monroe Ditch and one area along the south bank of Dicks Creek. The amount of PCBs transported by these seeps was found to be small compared to the earlier releases addressed by the interceptor trench (ARCADIS, Inc. 2002a). In fact, PCBs have not been detected in Dicks Creek sediment upstream of Outfall 002, where most of the groundwater seeps have been observed.

Each of the PCB-containing seeps identified to date has been remediated (Hileman 2003). Two seeps into Monroe Ditch (designated Seeps 11 and 12) and two seeps into Dicks Creek (Seeps 10 and 22) were addressed through the placement of amended soil in the seepage areas. The amended soil consisted primarily of peat, with the addition of elemental sulfur and vermiculite. Peat was selected because of its high organic carbon content and associated capacity to immobilize PCBs. Sulfur was added to reduce pH, and vermiculite was added to increase soil permeability. Due to the steep bank in the Monroe Ditch seep remediation area, a sheet pile wall, geotextile fabric, and rip rap were used to hold the amended soil in place. Exposed surface soil of the Dicks Creek seep remediation area was stabilized through revegetation. These measures appear to have significantly reduced or eliminated groundwater seepage in the remediated areas.

In 2003, an additional PCB-containing seep (Seep 40) was identified near Seeps 10 and 22. An alternative method was used to eliminate this PCB-containing seep. Specifically, a slurry of activated carbon and sulfur were injected into the soil in the area. This treatment was followed by injection of acetic acid, which effectively reduced the pH to a level considered unlikely to promote PCB migration (Hileman, 2003).

In 2007, AK Steel installed a phytoremediation barrier to control groundwater seeps emanating from the south bank of Dicks Creek (Section 4.5.12).

3.1.1.12 Dicks Creek and Tributaries

Sediment, surface water, and biota tissue from Dicks Creek and its tributaries have been extensively sampled and characterized. Biological community quality has also been extensively monitored. The results of these investigations through 2003 were compiled by ARCADIS (2004a,b). Monroe Ditch and two reaches of Dicks Creek are now being addressed through interim measures pursuant to the Consent Decree. Investigations conducted in support of sediment and floodplain Interim Measures are described in Section 4.

The Consent Decree provides that areas subject to Interim Measures will not require investigation under the RFI, unless there is reason to believe that there has been a release from the facility after the interim measures are implemented. The portion of Dicks Creek between Reach 1 and Outfall 004 is not slated for sediment removal and thus is not exempt from investigation under the RFI (with the exception of floodplain areas characterized under Interim Measure 1). However, this stream segment lies immediately upstream of areas that are slated for sediment remediation. If sediments in this area posed a risk to human health or the environment due to chemical contamination, then the area could potentially cause re-contamination downstream. Therefore, a *Focused Current Conditions Report* (ENVIRON, 2005a) was submitted to the U.S. EPA and Intervenors, to expedite assessment of this area prior to remediation of Reach 1. The *Focused Current Conditions Report* (included as Appendix F of this report) determined that there is no need to consider additional investigation activities or sediment removal from this area.

3.1.1.13 Great Miami River

The RFI/CMS SOW specifies that the RFI will characterize the Great Miami River, as it relates to Outfall 011, between river miles 49.0 and 52.0. Several investigations have characterized aquatic biological community quality and measured chemical concentrations in various environmental media at locations upstream, adjacent to, and downstream from Outfall 011. In 1995, the Ohio EPA measured fish and invertebrate community quality, surface water, and sediment quality (Ohio EPA, 1997). Unpublished data collected since 1995 were obtained from Ohio EPA's Division of Surface Water and included fish tissue data (collected in 1998), surface water data (collected in 2000) and biological community data (collected in 2000). EA Engineering conducted three years of biological community monitoring between 1998 and 2000, at locations upstream and downstream of Outfall 011 (EA, 1999; 2000; 2001). Surface water samples were also analyzed as part of EA's 1999 and 2000 surveys.

In addition to these studies, AK Steel routinely monitors various water chemistry and toxicity parameters for effluent discharged through Outfall 011. Toxicity testing is also conducted for the receiving water (i.e., upstream Great Miami River water). Ohio EPA has also periodically performed toxicity testing on Outfall 011 effluent, as well as on upstream receiving water and water collected within the acute mixing zone (conducted in 2000, 2007, and 2008).

Data resulting from the investigations described above are provided in Appendix E-12. Aquatic biological community quality data for the Great Miami River are described in Section 3.2.6.2, and chemistry and toxicity data for the Great Miami River are evaluated in Section 3.2.10.

3.1.1.14 Underground Storage Tanks Closures

There were five underground storage tank (UST) systems, regulated under Ohio's State Fire Marshal, Bureau of Underground Storage Tank Regulations (BUSTR). All the UST systems were removed pursuant to BUSTR's statutes, and were granted no further action (NFA) status. The NFA letter from each release is presented in Appendix E-13. A brief summary of the UST systems are as follows:

- Release Number 09000361-N00001(Old Release Number: 99923-01) - In November 1989, two 4,000-gallon gasoline, one 1,000-gallon gasoline, one 550 gallon gasoline, and one 1,000-gallon diesel fuel UST systems were removed from the North Plant Area. The closure standards for the constituents of concern in soil were determined using the BUSTR's Site Feature Scoring System. Soil concentrations in the UST cavity exceeded the closure standards and subsequent site assessment activities were completed in May 1993. The site assessment activities included the advancement of three soils borings, and the submittal of samples for laboratory analysis. In August 2003, the site assessment report was submitted to BUSTR, and a NFA was issued on November 3, 1993.

- Release Number 09000361-N00002 (Old Release Number: 99923-02) - On December 1989, one 18,000-gallon hydraulic oil, one 18,000-gallon lubricating oil, and one 12,000-gallon rolling oil UST systems were removed from the North Plant Area adjacent to Former Used Oil Reclamation Facility Number 3 (SWMU 9). The closure standards for the constituents of concern in soil were determined using the BUSTR's Site Feature Scoring System. Soil concentrations in the UST cavity exceeded the closure standards and subsequent site assessment activities were completed in May 1993. Site assessment activities included the advancements of three soil borings, and the submittal of samples for laboratory analysis. Laboratory analytical results indicated that total petroleum hydrocarbons exceeded the closure standards. On May 2, 2003, a risk assessment was submitted to BUSTR using risk based corrective action that is outlined in the 1999 BUSTR Corrective Action Rule. Based upon the conclusions of the risk assessment report, BUSTR issued a NFA status on May 9, 2003.

- Release Number 09000361-N00003 (Old Release Number: 99923-03) - On September 6, 1990, two 15,000 gallon oil UST systems were removed from the South Plant Area near door 644 of building 6021. The closure standards for the constituents of concern for soil were determined using the BUSTR's Site Feature Scoring System. Soil concentrations in the UST cavity exceeded the closure standards. On October 11, 1990, over-excavation (corrective action) of impacted soils in the UST cavity was implemented, and confirmation samples were collected for laboratory analysis. Based on the laboratory analytical results from the over-excavation activities, BUSTR issued a NFA status on October 26, 1992.

- Release Number 09000361-N00004 (Old Release Number: 99923-04) - On August 6, 1992, one 30,000-gallon used oil UST system was removed from the Melt Plant Area. The closure standards for the constituents of concern in soil were determined using the BUSTR's Site Feature Scoring System. Soil concentrations in the UST cavity exceeded the closure standards. On September 2 and 16, 1992, over-excavation (corrective action) of impacted soils in the UST cavity was completed and confirmation samples were collected for laboratory analysis. Based on the laboratory analytical results, subsequent site assessment activities were completed in May 1993, which included the advancement of three soil borings. The samples collected from the borings indicated that total petroleum hydrocarbons exceeded the closure standards. On May 8, 2003, a risk assessment was submitted to BUSTR using risk based corrective action that is outlined in the 1999 BUSTR Corrective Action Rule. Based upon the conclusions of the risk assessment report, BUSTR issued a NFA status on May 9, 2003.

- Release Number 09000361-N00005 (Old Release Number: 99923-06) - On November 1, 1995, one 1,000-gallon diesel fuel UST system was removed from the North Plant Area near the Wicoff gate entrance. The closure standards for the constituents of concern in soil were determined by using the BUSTR's Site Feature Scoring System. Soil concentrations in the UST cavity did not exceed the closure standards and the closure assessment report was submitted to BUSTR on November 17, 1995. A NFA was issued by BUSTR on July 8, 1996.

3.1.2 Data Evaluation and Screening

This CCR for the Middletown Works is designed to take advantage of readily accessible data and build off this data to assess whether a SWMU/HWMU/AOC/AA should be retained for further evaluation within the RFI process and to identify potential data gaps that might be filled through the collection of additional data. This will be accomplished by identifying DQOs associated with previous investigations and conducting a comparison of data collected from selected previous investigations to the U.S. EPA RSLs. The results of this data evaluation and screening are used to support the determination for further evaluation as presented in Section 6.

3.1.2.1 DQO Process

As defined by the U.S. EPA (U.S. EPA 1998), the DQO process is a seven-step process designed to ensure that data collection is resource effective while meeting the objectives of the study. The following text describes each of the DQO steps.

The first step of the DQO process is to state the problem and define the purpose of the study. One purpose of this CCR is to use existing data sets to assess whether there is evidence of a release and whether existing data are sufficient to adequately characterize contaminant levels at a SWMU/HWMU/AOC/AA.

The second step of the DQO process is to identify the questions which the data are intended to answer and the decisions that follow those questions. The data are used in this CCR to determine (1) have chemicals managed in a SWMU/HWMU/AOC/AA been released into the environment, and (2) are these constituents present at concentrations that would be considered potentially significant.

The third step of the DQO process is the identification of data sources that can be used as inputs into the decision-making process. Potential sources of data were identified through the examination of historical records, database searches, and previous reports completed for the site (Sections 2 and 3, Appendices A and E). For a data source to be considered useable, it must meet the following minimum requirements:

- Field samples collected using standard methods,
- Analyses performed by an accredited laboratory, and
- Data set includes appropriate quality assurance/quality control (QA/QC) samples.

In addition to the minimum requirements, the following criteria are desirable and add credibility to the data set:

- Collected and analyzed under an EPA approved Quality Assurance Project Plan (QAPP),
- Collected and analyzed under a formal QAPP and/or sampling plan (not necessarily EPA-approved), and
- Analytical data validated according to relevant National Functional Guidelines.

The majority of these data used in this CCR was collected under the requirements of an Ohio EPA or U.S. EPA regulatory program, and as such were collected and analyzed to meet appropriate quality assurance standards. For data that was collected by AK Steel on a voluntary basis, these data were all collected using generally accepted industry standards for data collection, sample integrity (chain of custody) and analysis such that they would provide data of a known accuracy and precision to support the specific evaluation.

The fourth step in the DQO process is the specification of the study boundaries, both spatially and temporally. The unit data sheets (Appendix A) provide information on the physical limits of each SWMU/HWMU/AOC/AA as well as information on the time of operation during which a release to the environment may have been possible. The location and timing of the historical data collection was considered when evaluating whether these data were appropriate for evaluating release potential, a further action determination, and the adequacy of the data set for each SWMU/HWMU/AOC/AA.

The fifth and sixth steps in the DQO process are the determination of analytical approach, decision rules and limits on decision errors. The evidence of release potential is assessed based on presence or absence of a constituent in the environment that may have been managed at a particular SWMU/HWMU/AOC/AA. Then, the significance of the potential release is evaluated based on frequency of detections, both spatially and temporally, as well as the maximum concentration compared to some conservative screening criteria (e.g., RSLs).

The final step in the DQO process is to optimize the design. Given that all the data were previously collected, the data are evaluated here to determine if they are appropriate to the study and questions being asked. The data identified and included in this CCR all meet or exceed the minimum requirements given above and are deemed appropriate to the goals of this CCR. Data gaps that may be identified at a particular SWMU/HWMU/AOC/AA will be addressed during the design of the RFI field program for those units requiring further evaluation, to be presented in the forthcoming RFI Work Plan(s).

3.1.2.2 DQOs for Previous Investigations

Previous investigations, ongoing remediation and groundwater monitoring programs, and report references were presented in Section 3.1.1. These data meet or exceed the minimum requirements given above, are appropriate for use in the CCR, and are included in this CCR to support the unit screening decision-making process (Section

6). All reports associated with the previous investigations were submitted to the Ohio EPA and/or U.S. EPA. The following paragraphs provide additional assessment of the DQO process for these selected investigations.

3.1.2.2.1 Site-wide Groundwater Monitoring

The objective of the site-wide monitoring program is to monitor groundwater quality for the upper, intermediate, and lower aquifer units primarily at the plant boundaries. The water quality data is used in conjunction with the groundwater flow information and plant production well pumping to develop a complete groundwater management plan. Beginning in 1989, the network of wells were sampled for four consecutive quarters, these samples were analyzed for VOCs and metals. The primary VOCs detected included benzene in GM-4S and TCE in GM-27S. The metals analyses from groundwater samples were below the Primary Drinking Water Standards in effect at the time of the sampling event and this comparison supported the decision at that time to not include metals in future sampling events. An assessment of these metals concentrations in groundwater compared to RSLs is presented in Section 3.10.3. Since 1992, these monitoring wells were sampled and analyzed for VOCs and include the collection of field parameters on an annual basis. Also since 1992, site-wide water level measurements are collected on a semi-annual basis. Samples were collected according to standard sampling methods and analyzed for VOCs using SW-846 Methods (currently 8260B). The data set also included results of QA/QC samples including required laboratory QC samples, equipment blanks, duplicate samples, and trip blanks for event. Production well pumping data are compared with the modeled target pumping rates necessary to obtain plant-wide groundwater capture in the intermediate and lower aquifers beneath the plant. Semi-annual reports are submitted to the Ohio EPA that include groundwater flow maps for the plant-wide monitoring well network in the upper, intermediate, and lower aquifer units, production well pumping rates, groundwater quality data, and an evaluation of the capture zone created by production well pumping beneath the plant. This site-wide groundwater monitoring program has been conducted on a voluntary basis by AK Steel and has provided an appropriate data set based on the field and analytical methods consistently followed. This data will be used in the CCR to support release assessments, unit screening determinations for select units, and identify data gaps.

Data Source: 1989 to 2009 Site-wide Groundwater Monitoring Reports		
	Yes	No
EPA Approved QAPP?		✓
Other formal QAPP/Sampling Plan?	✓	
Data validation according to functional guidelines?	✓	
Standard methods for sampling and analysis?	✓	
Accredited laboratory?	✓	
Relevant QA/QC sample information included with data set?	✓	

3.1.2.2.2 Benzene in Groundwater Investigation

Benzene was first detected in monitoring well GM-4S in 1989 during a quarterly groundwater sampling event discussed in the previous paragraph. As a result, a two-phased groundwater investigation was conducted in 1991 and 1992 with the objective of delineating the extent of benzene in shallow groundwater. To accomplish this objective, slug tests were performed and analyzed to determine hydraulic properties of the aquifer, groundwater flow modeling and particle tracking were completed, and a field investigation was implemented to determine the extent of benzene in the upper aquifer. The investigation included collection of groundwater data using probe sampling (hydropunch) to provide data to support placement of permanent wells, sampling of these wells, and collection of water-level data. Standard methods were followed for field sampling and sample analysis was performed according to EPA Methods, including collection and analysis of QA/QC samples. Duplicates, field blanks, and trip blanks were submitted with the field samples. As a result of this investigation, it was determined that historical releases from the coal tar storage tanks (AOC 2) were determined to be the most likely source of benzene in shallow groundwater in the vicinity of GM-4S. The extent of benzene was delineated. An evaluation of biological attenuation of this benzene release area was conducted to assess the level of intrinsic biological attenuation occurring within the upper aquifer. In 1995 and 1997, biogeochemical data were collected from the existing monitoring well network and reviewed. This data indicated that biodegradation was occurring as evidenced by the decrease of benzene concentrations over time. As concluded in this study, based on the decreasing trend, the immobile characteristics of the plume, and the bioattenuation occurring at the site, the benzene concentrations should continue to decrease without further migration. Since 2001, benzene has not been detected in all of these wells. AK

Steel conducted this work on a voluntary basis, and submitted reports to the Ohio EPA. Data collected from this investigation and bioattenuation study will be used to support a unit screening determination for AOC 8.

Data Sources: Results of Phase II Investigation to Determine the On-Site Extent of Benzene in Ground Water 1992; 1989 to 2009 Site-wide Groundwater Pumping, Flow and Quality Reports		
	Yes	**No**
EPA Approved QAPP?		✓
Other formal QAPP/Sampling Plan/Work Plan?	✓	
Data validation according to functional guidelines?	✓	
Standard methods for sampling and analysis?	✓	
Accredited laboratory?	✓	
Relevant QA/QC sample information included with data set?	✓	

3.1.2.2.3 Coke Oven Gas Release Investigation

After discovery of the coke oven gas release, groundwater investigation and remediation were conducted. The objective of this program was to characterize groundwater quality in the vicinity of the release and to implement an SVE system to recover coke oven gas from the surrounding shallow soil. The groundwater investigation included collection of groundwater samples using probe sampling and installation of permanent monitoring wells. Based on the results of this study, groundwater remediation using chemical oxidation was initiated to address residual benzene concentrations in the shallow aquifer. Standard methods were followed for field procedures and samples were analyzed using EPA Methods, including collection and analysis of QA/QC samples (trip blanks). It was concluded from this investigation that the occurrence and relative distribution of BTEX compounds identified in groundwater are consistent with their presence in coke oven gas within the former pipeline. Based on the groundwater monitoring data, chemical oxidation has successfully addressed the benzene present in the upper aquifer and the most recent sampling results from 2007 indicated benzene concentrations were below detectable levels. AK Steel conducted this investigation and remediation on a voluntary basis. These data reports were submitted to the Ohio EPA. Data collected from this investigation, on-going monitoring, and previous remediation efforts will be used to support a unit screening determination for SWMU 44.

Data Sources: Groundwater Investigation Report Former Coke Oven Gas Pipeline Area 1996; Status Report for COG Pipeline Leak Remediation Project 2005; Annual Groundwater Sampling of Coke Oven Gas Pipeline Release 2007		
	Yes	**No**
EPA Approved QAPP?		✓
Other formal QAPP/Sampling Plan/Work Plan?	✓	
Data validation according to functional guidelines?		✓
Standard methods for sampling and analysis?	✓	
Accredited laboratory?	✓	
Relevant QA/QC sample information included with data set?	✓	

3.1.2.2.4 Robin Hood Coal Pile RCRA Closure

The closure objective was to verify that K087 had not been released to the underlying soil or groundwater beneath the coal pile. To meet this objective, a multiple-phased release verification sampling program was completed and background-derived statistical limits were determined. A sufficient sampling program was completed for an appropriate list of analytes. Standard SW-846 Methods were followed for field procedures and sample analysis, including collection of QA/QC samples (duplicates, rinse blanks, and trip blanks). Soil excavation and verification sampling were completed until clean closure of the coal tar decanter sludge (K087) Storage Area at the Former Robin Hood Coal Pile was achieved. All project plans and investigation results were submitted to the Ohio EPA. RCRA closure was approved by the Ohio EPA on June 13, 2000. Data collected from this RCRA closure will be used to support a unit screening determination for Robin Hood Coal Pile.

Data Sources: Robin Hood Closure Certification Report 2000		
	Yes	**No**
EPA Approved QAPP?		✓
Other formal QAPP/Sampling Plan/Work Plan?	✓	
Data validation according to functional guidelines?	✓	
Standard methods for sampling and analysis?	✓	
Accredited laboratory?	✓	
Relevant QA/QC sample information included with data set?	✓	

3.1.2.2.5 TCE Groundwater Investigation

TCE has been detected in the intermediate monitoring well GM-27S since the well was first sampled in 1989. The objective of this investigation was to determine whether the source of TCE detected in this well was associated with the North Plant Area. To meet this objective, additional wells were installed to evaluate groundwater quality and flow direction. Standard methods (SW-846) were followed for field procedures and sample analysis, including collection of QA/QC samples (duplicates, rinse blanks, trip blanks). In addition, historical information was researched to identify a potential source of the TCE. Well GM-27S is voluntarily monitored on an annual basis by AK Steel to evaluate groundwater quality and flow direction. The groundwater quality data are submitted to the Ohio EPA in the Site-Wide Report and in the 1998 report. Data collected from this investigation will be used to support any further evaluation of the GM-27S TCE Plume.

Data Sources: Groundwater Investigation for the GM-27S TCE Plume 1998; 1989 to 2009 Site-wide Groundwater Pumping, Flow and Quality Reports		
	Yes	**No**
EPA Approved QAPP?		✓
Other formal QAPP/Sampling Plan/Work Plan?	✓	
Data validation according to functional guidelines?	✓	
Standard methods for sampling and analysis?	✓	
Accredited laboratory?	✓	
Relevant QA/QC sample information included with data set?	✓	

3.1.2.2.6 Slag Processing Area Investigations

The objective of the soil and groundwater investigation was to evaluate site conditions and potential risks to human health and the environment. The investigation was conducted as required by an Administrative Order issued by the U.S. EPA. The objectives were accomplished by further evaluating the following: (1) history of the Slag Processing Area operations and current water use, (2) horizontal and vertical extent of PCBs in soil, (3) potential groundwater-flow pathways, (4) distribution of groundwater-borne PCBs, (5) locations of groundwater seeps into Monroe Ditch and Dicks Creek (including groundwater seep quality), (6) the potential interaction between water-bearing units, Monroe Ditch, and Dicks Creek, and (7) the potential causes of high groundwater pH. From June 1998 through September 2000, four investigations were completed to collect sufficient data to address the previously stated objectives. Soil and groundwater samples were analyzed for PCBs, PAHs, and metals. Standard SW-846 Methods were followed for field procedures and sample analysis, including collection of QA/QC samples (duplicates, rinse blanks, matrix spikes/matrix spike duplicates). The abundance and distribution of PCBs, PAHs, and metals were evaluated in soil and groundwater. In shallow soils (less than 2 feet), total PCBs were detected in thirty-four of the seventy-two surface soil samples analyzed. In deeper soils, total PCBs were detected in eighty-five of the one hundred fifty-five samples analyzed. A work plan and QAPP, along with the investigation results were submitted to the U.S. EPA. Data collected from this soil and groundwater investigation will be used to support unit screening determinations for those SWMUs and AOCs present within the Slag Processing Area.

Data Sources: Soil and Groundwater Investigation of the Slag Processing Area 2002		
	Yes	**No**
EPA Approved QAPP?	✓	
Other formal QAPP/Sampling Plan/Work Plan?	✓	
Data validation according to functional guidelines?	✓	
Standard methods for sampling and analysis?	✓	
Accredited laboratory?	✓	
Relevant QA/QC sample information included with data set?	✓	

3.1.2.2.7 USDW-01 Groundwater Monitoring

Monitoring well USDW-01 was installed for the purpose of monitoring groundwater quality in the deep portion of the upper aquifer drinking water source in the vicinity of two permitted injection wells. The deep injection wells are permitted through the Underground Injection Control (UIC) sector of the Ohio EPA. Groundwater samples have been collected from USDW-01 on a semi-annual basis since 1995 and the samples analyzed for an appropriate list of water quality parameters and dissolved metals as required by the UIC permit. Standard EPA Methods are followed for field procedures and sample analysis, including collection of QA/QC samples (duplicates, rinse blanks). Statistical modeling is performed to compare baseline conditions (established in 1994) to the results of each sampling event. Semi-annual reports are submitted to the Ohio EPA. Data collected from this monitoring program have not indicated any significant changes in groundwater quality are occurring. Data collected from this on-going monitoring program will be used to support unit screening determinations for HWMUs 1 and 2.

Data Sources: USDW-01 Groundwater Monitoring 1995 to 2009		
	Yes	**No**
EPA Approved QAPP?		✓
Other formal QAPP/Sampling Plan/Work Plan?	✓	
Data validation according to functional guidelines?	✓	
Standard methods for sampling and analysis?	✓	
Accredited laboratory?	✓	
Relevant QA/QC sample information included with data set?	✓	

3.1.2.2.8 Landfill 1 Detection Groundwater Monitoring

Landfill 1 is classified as a Class III residual waste landfill and therefore, is regulated under a groundwater monitoring program pursuit to the OAC 3745-30-08. The purpose of this program is to perform detection monitoring of groundwater at the closed Landfill 1 (SWMU 43) as required by the landfill permit. An adequate network of upper aquifer monitoring wells has been installed upgradient and downgradient of this landfill. These wells have been sampled on a semi-annual basis since 1997. Samples are collected for field parameters and analyzed for an appropriate list of water quality parameters. Standard SW-846 and EPA Methods are followed for field procedures and sample analysis, including collection of QA/QC samples (duplicates, rinse blanks). A statistical evaluation is conducted on the data collected from each sampling event. Semi-annual reports are submitted to the Ohio EPA. Data collected from this on-going monitoring program will be used to support a unit screening determination for SWMU 43.

Data Sources: Landfill 1 Detection Groundwater Monitoring 1997 to 2009		
	Yes	**No**
EPA Approved QAPP?		✓
Other formal QAPP/Sampling Plan/Work Plan?	✓	
Data validation according to functional guidelines?	✓	
Standard methods for sampling and analysis?	✓	
Accredited laboratory?	✓	
Relevant QA/QC sample information included with data set?	✓	

3.1.3 Screening of Existing Data

As stated in Part 1of the Attachment 2: RFI/CMS SOW, all of the existing constituent characterization data are to be compared to screening levels to identify areas that may be eliminated from further evaluation. The following section summarizes the results of screening the historical data collected from previous investigations. The comparison results are divided by area or event, similar to Section 3.1.1. The screening levels used in this evaluation were obtained from the U.S. EPA RSL table dated December 10, 2009 (Appendix G), where the screening levels for industrial soil, tapwater, and risk-based soil screening levels (SSLs) were compared to historical data. The values presented in the RSL table correspond to those derived based on a target cancer risk of 1×10^{-6} or a hazard quotient of 0.1. The data were compared to the RSLs based on a target cancer risk of 1×10^{-5} since this target risk level represents the midpoint of the target risk range and the site will remain industrial in the future.

3.1.3.1 Site-Wide Groundwater Monitoring

As part of the groundwater investigation begun in 1987 to assess groundwater conditions within and at the boundaries of the plant, the groundwater quality was also evaluated in 1989 and 1990 (Geraghty & Miller, Inc. 1990a). Several VOCs were detected in groundwater samples. Primarily this included detections of benzene in GM-4S and TCE in GM-27S. These monitoring wells have been sampled since 1990 and the discussion below will focus on more recent groundwater conditions. Annual groundwater monitoring data are available since 1995.

1989 and1990 Site-wide Groundwater Data: The data collected during these sampling events are presented in Appendix E-5. The following presents the analytes that exceeded the adjusted RSLs in groundwater from these sampling event(s):

- Arsenic concentrations exceeded the adjusted RSL of 0.45 ug/L in GM-4S *(March 1990)*, GM-7D *(March 1990 and September 1990)*, GM-9S *(March 1990 and September 1990)*, GM-26S *(September 1990)*, GM-29D *(March 1990 and September 1990)*, GM-40D *(March 1990)*, GM-46S *(March 1990 and September 1990)*, and GM-46D *(March 1990 and September 1990)*;

- Benzene concentrations exceeded the adjusted RSL of 4.1 ug/L in GM-4S *(November 1989, March 1990, June 1990, and September 1990)*, GM-7D *(November 1989)*, GM-8S *(November 1989)*, GM-9S *(November 1989)*, GM-20S *(November 1989)*, and GM-27S *(November 1989)*;

- Carbon tetrachloride concentrations exceeded the adjusted RSL of 2 ug/L in GM-6S *(March 1990)*, and GM-8S *(November 1989 and March 1990)*;

- 1,2-Dichloroethane concentrations exceeded the adjusted RSL of 1.5 ug/Lin GM-8S *(November 1989)* and GM-9S *(November 1989)*;

- Methylene Chloride concentrations exceeded the adjusted RSL of 48 ug/L in GM-4S *(November 1989)* and GM-44S *(November 1989)*;

- Tetrachloroethene concentrations exceeded the adjusted RSL of 1.1 ug/L in GM-28S *(November 1989)*;

- 1,1,2-Trichloroethane concentrations exceeded the adjusted RSL of 2.4 ug/L in GM-9S *(November 1989)*; and

- Trichloroethene concentrations exceeded the adjusted RSL of 20 ug/L in GM-27S *(November 1989, March 1990, June 1990, and September 1990)*.

1995 through 2009 Site-wide Data: The data collected during these sampling events are presented in Appendix E-5. The following presents the analytes that exceeded the adjusted RSLs in groundwater from these sampling event(s):

- Benzene concentrations exceeded the adjusted RSL of 4.1 ug/L in GM-4S *(March 1995, March 1996, and June 1997)*; GM-50S *(March 1995, March 1996, June 1997, March 1999, and April 2000)*; GM-52S *(March 1995, March 1996, June 1997, March 1998, March 1999, and April 2000)*; GM-54S *(March 1995, March 1996, June 1997, March 1998, and March 1999)*; and GM-55S *(March 1995, March 1996, June 1997, and March 1999)*;

- Chloroform concentrations exceeded the adjusted RSL of 1.9 ug/L in GM-39D *(March 1995)*; and GM-50S *(March 1999)*; and

- Trichloroethene concentrations exceeded the adjusted RSL of 20 ug/L in GM-27S from every sampling event, which includes 1995 through 2009.

3.1.3.2 Benzene in Groundwater Investigation

Benzene was first detected in the monitoring well GM-4S in 1989 during the site wide groundwater sampling event (Section 3.1.1.3). Based upon the location of GM-4S, it was suspected that the source of the elevated benzene concentrations was from the coal tar storage tanks (AOC 2). The following presents the analytes that exceeded the adjusted RSLs in soil and groundwater:

Soil: Soil samples were collected and submitted for laboratory analyses during the 1991 site investigation. Benzene was below industrial adjusted RSL of 54 mg/kg, and the adjusted SSLs of 0.0021 mg/kg based on a dilution attenuation factor of 1. Methylene chloride was the only constituent detected from the three soil sample intervals at GM-52S (4-6 feet bls), GM-50S (8-10 feet bls), and GM-51S (6-8 feet bls) at 6 mg/kg, 10 mg/kg, and 10 mg/kg, respectively. Methylene chloride concentrations were all less than the industrial adjusted RSL of 530 mg/kg, but exceeded the adjusted SSL of 0.012 mg/kg based on a dilution attenuation factor of 1 (Table 11 of Appendix E-6).

Groundwater: Prior to installing monitoring wells GM-50S through GM-53S, hydropunch samples were collected at these locations and four soil borings (CT-5C, CT-8F, CT-9G, and CT-7H were drilled. The following presents the analytes that exceeded the adjusted RSLs in the groundwater samples from the hydropunch site investigation:

- Benzene concentrations exceeded the adjusted RSL of 4.1 ug/L in GM-50S *(31-33 feet)*; GM-52S *(16-18 feet, 20-22 feet, 28-30 feet, and 42-44 feet)*; CT-7H *(22-24* *feet and 28-30 feet)*; CT-8F *(22-24 feet and 28-30 feet)*; and CT-9G *(22-24 feet and 30 feet)* (Table 8 of Appendix E-6).

Upon installing wells GM-50S through GM-53S, groundwater samples were collected from each well and from existing well GM-4S. The following presents the analytes that exceeded the adjusted RSLs in the groundwater samples from the groundwater site investigation:

- Benzene concentrations exceeded the adjusted RSL of 4.1 ug/L in GM-4S, GM-50S, and GM-52S. (Table 12 of Appendix E-6).

3.1.3.3 Coke Oven Gas Pipeline Release Investigation

In January 1996 a release of coke oven gas had occurred from the distribution pipeline (SWMU 44). Corrective actions were conducted to address the impacted soil and groundwater (refer to Section 2.6.2). As part of the site investigation, a groundwater quality was characterized in the vicinity of this release. This included the collection of groundwater samples from the monitoring well network.

<u>Groundwater Monitoring (1996 through 2007):</u> The data collected during these sampling events are presented in report tables in Appendix E-2. The following presents the wells that exceeded the adjusted RSL of 4.1 ug/L for benzene in groundwater from these sampling events:

- April 1996 (BW-1 and BW-2);
- June 1996 (DMW-3S, DMW-4S, and DMW-4D);
- February 1997 (EW-2, EW-3, and EW-4);
- May 1997 (DMW-3S, DMW-4S, DMW-4D, DMW-10, and DMW-11);
- November 1997 (DMW-11, BW-1, and BW-2);
- March 1998 (BW-1);
- September 1998 (DMW-10, DMW-11, BW-1, BW-2, and BW-3);

- October 1998 (EW-1, EW-2, EW-3, EW-5, BW-1, BW-2, and BW-3);
- December 1998 (EW-6, EW-7 and EW-8);
- April 1999 (DMW-4S, DMW-4D, DMW-10, DMW-11, EW-3, EW-5, EW-6, EW-7, P-1, BW-1 and BW-3);
- October 1999 (DMW-4D, DMW-11, EW-4 and EW-5);
- April 2000 (DMW-11, EW-3, EW-5, and EW-6);
- August 2000 (DMW-11, EW-3, EW-5 and EW-6);
- December 2000 (DMW-11, EW-3, EW-5, and EW-6);
- April 2001 (DMW-11 and EW-6);
- June 2001 (EW-3 and EW-6);
- October 2001 (DMW-11, EW-3, EW-5, and EW-6);
- January 2002 (EW-3 and EW-6);
- May 2002 and July 2002 (EW-6);
- November 2002 (EW-6 and EW-7); and
- May 2003 and June 2004 (EW-6).

3.1.3.4 Robin Hood Coal Pile RCRA Closure

The Robin Hood Coal Pile underwent RCRA closure, pursuant to Ohio EPA regulations (OAC 3745-55-10). Ohio EPA granted AK Steel a closure status on June 13, 2000. Details of the closure activities for the Robin Hood Coal Pile are presented in Section 3.1.1.6.

During the over-excavation activities at the east end of the Robin Hood Coal Pile, soil samples (verification) were collected on the walls and floor of the excavation to confirm that the impacted soils were removed. Soil data from verification samples from the closure activities are presented in the report tables in Appendix E-7. Verification samples VS-01 through VS-04, and VS-06 exceeded the closure standards; therefore, over-excavation of the impacted soils were initiated and re-sampled. Verification samples VS-05 VS-07, VS-08, and VS-09 represent the benzene concentrations for the adjusted RSLs.

- Benzene was detected below industrial soil adjusted RSL of 54 mg/kg in all samples. Benzene exceeded the adjusted SSL with a DAF of 1 (0.0021 mg/kg) in all the samples.

3.1.3.5 TCE Groundwater Investigation

As discussed in Section 3.1.1.7, TCE has exceeded the adjusted RSL of 20 ug/L in GM-27S during each sampling event between 1989 to 2009 (Appendices E-6 and E-10).

3.1.3.6 Slag Processing Area Investigations

In the past, comprehensive sediment, soil, and groundwater site investigations were completed in the Slag Processing Area (Appendix E-9) to mainly evaluate the PCBs in the soil and groundwater.

<u>Soil:</u> Soil samples were collected and submitted for laboratory analyses during environmental investigations between December 1997 and September 2000 as well as a soil and groundwater investigation between July 2001 and December 2001 (ARCADIS, Inc. 2002a). Multiple RSLs are available for some constituents; therefore the lowest of the adjusted RSLs were used for comparison.

- Concentrations of PCB (aroclor 1242) exceeded the adjusted RSL of 7.4 mg/kg in BH15-04 (6-8 feet and 8-10 feet).

- Concentrations of PCB (aroclor 1248) exceeded the adjusted RSL of 7.4 mg/kg in BH07-01 (10-12 feet), BH08-W65 (2-4 feet), BH13-01 (6-8 feet), BH13-S50 (6-8 feet), BH15-N50 (6-8 feet), MDA-35SR (6-8 feet), MDA-BH07 (6-8 feet), MDA-BH08 (6-8 feet), MDA-BH13 (6-8 feet), MDA-SS-01 (0-2 feet), MDA-SS-01 (2-2.5 feet), and SS01-S14 (3 feet).

- Concentrations of homologue PCB (hexachlorobiphenyl) exceeded the adjusted RSL of 0.011 mg/kg in BH15b (6-8 feet) and SS01b (2-4 feet).

- Concentrations of homologue PCB (pentachlorobiphenyl) exceeded the adjusted RSL of 0.0011 mg/kg in BH13b (6-8 feet), BH15b (6-8 feet), BH26SL (12-14 feet), MDA-27P-01 (0-1 feet), MDA-27P-67 (6-7 feet), MDA-29S-01 (0-1 feet), MDA-29S-1213 (12-13 feet), MDA-29S-23 (2-3 feet), MDA-29S-45 (4-5 feet) and SS01b (2-4 feet).

- Concentrations of homologue PCB (tetrachlorobiphenyl) exceeded the adjusted RSL of 11 mg/kg in BH15b (6-8 feet) and SS01b (2-4 feet).

- Concentrations of benzo(a)pyrene exceeded the adjusted RSL of 2.1 mg/kg in BH07-01 (10-12 feet), BH08-01A (14-16 feet), MDA-16SR (2-4 feet), and SS012-03 (2-4 feet).

- Concentrations of naphthalene exceeded the adjusted RSL of 18 mg/kg in MDA-16SR (2-4 feet) and MDA-33S (10-12 feet).

Perched and/or Shallow Groundwater Zone(s): Groundwater samples were collected and submitted for laboratory analyses during environmental investigations between December 1997 and September 2000 as well as a soil and groundwater investigation between July 2001 and December 2001 (ARCADIS, Inc. 2002a). Multiple RSLs are available for some constituents; therefore the lowest of the adjusted RSLs were used for comparison.

- Concentrations of PCB (aroclor 1242) exceeded the adjusted RSL of 0.34 ug/L in GM-46SR (August 2001 and October 2001), MDA-22P (July 1998), MDA-26S (August 2001 and October 2001), MDA-27S (August 2001 and October 2001), PW-MDA-22P (July 1998), and PW-MDA-25P (July 1998).

- Concentrations of PCB (aroclor 1248) exceeded the adjusted RSL of 0.34 ug/L in GM-35S (July 1998), MDA-03P (June 1998), MDA-08P (June 1998), MDA-08S (June 1998), MDA-25P (July 1998), PW-MDA-03P (July 1998), PW-MDA-08P (July 1998), and PW-MDA-08S (July 1998).

- Concentrations of homologue PCB (pentachlorobiphenyl) exceeded the adjusted RSL of 5.2E-5 ug/L in MDA-08P (October 1998).

- Concentrations of homologue PCB (tetrachlorobiphenyl) exceeded the adjusted RSL of 0.052 ug/L in MDA-08P (October 1998) and MDA-08S (October 1998).

- Concentrations of PAH (naphthalene) exceeded the adjusted RSL of 1.4 ug/L in MDA-03P (August 2001), MDA-08P (August 2001), MDA-33S (October 2001), and PW-MDA-08P (July 1998).

- Concentrations of total lead exceeded the adjusted RSL (compared to lead subacetate) of 18 ug/L in PW-MDA-03P (July 1998), PW-MDA-03S (July 1998), PW-MDA-08P (July 1998), PW-MDA-14S (July 1998), PW-MDA-15S (July 1998), PW-MDA-16S (July 1998), PW-MDA-17S (July 1998), PW-MDA-22P (July 1998), PW-MDA-23P (July 1998), PW-MDA-24P (July 1998) and PW-MDA-25P (July 1998).

3.1.3.7 USDW-01 Groundwater Monitoring

In 1993, AK Steel installed a lowermost underground source of drinking water (USDW) well (USDW-01) in the vicinity of the two class I injection wells located in the South Plant Area. Details on the operations of the injection wells and the monitoring program are presented in Section 3.1.1.9.

<u>2001 through 2009 USDW-01 Data:</u> The data collected during sampling events at well USDW-01 are presented in Appendix E-10. No analytes exceeded the adjusted RSLs in groundwater.

3.1.3.8 Landfill 1 Detection Groundwater Monitoring

Landfill 1 is a closed landfill located east of the Slag Processing Area and is classified as a Class III residual waste landfill. In 1997, a closure plant was submitted to Ohio EPA, pursuit to the OAC 3745-30-08 and is currently in a detection monitoring program. Details of the monitoring program are presented in Section 3.1.1.10.

<u>2001 through 2009 Landfill 1 Data:</u> The data collected during the sampling events of the monitoring well network (MW-1S, MW-3S, GM-28S, GM-31S, GM-62S, GM-65S, and GM-66S) are presented in Appendix E-11. The following presents the wells that exceeded the adjusted RSL in groundwater:

- Arsenic concentrations exceeded the adjusted RSL of 0.45 ug/L in MW-1S (January 2001, 2007, and 2009), MW-3S (January 2002, 2003, 2007, 2008, and

2009), GM-31S (January 2008 and 2009), GM-62S (January 2009), GM-65S (January 2008 and 2009), and GM-66S (January 2009).

- Chromium concentrations exceeded the adjusted RSL of 0.43 ug/L in MW-1S (January 2009), MW-3S (January 2008 and 2009), GM-31S (January 2008 and 2009), GM-62S (January 2009), GM-65S (January 2009), and GM-66S (January 2008).

In addition, groundwater samples from monitoring wells MW-3S, MW-5S, GM-28S, GM-28D, and GM-33S are sampled for VOCs annually, which is presented in Section 3.1.3.1. The only constituent that exceeded the adjusted RSLs was tetrachloroethene in GM-28S in November 1989.

3.2 Preliminary Site Conceptual Model

The following section presents the components of the Preliminary Site Conceptual Model, pursuant to Attachment 2 RFI/CMS SOW of the Consent Decree.

Characterizing the site includes describing important aspects of the hydrogeologic system and the local demography and land use and the environmental setting (surface water and drainage features, geology, hydrogeology, groundwater use). This characterization incorporates the most current available information known from the recent Refinement to the Groundwater Flow Model (ARCADIS 2009). A discussion of groundwater quality and data evaluation is also included. The current site characterization data provides the basis for developing the site-wide preliminary site conceptual model (SCM) including the pathways, routes, and receptors.

3.2.1 Demography and Land Use

AK Steel is located in the City of Middletown in Butler County, southwestern Ohio. Coordinates for the center of the plant are 39º 30’ North latitude and 84º 22’ 30” West longitude (Figure 3). AK Steel is bounded by Lefferson Road and Route 122 to the north, Yankee Road to the west, Oxford State Road to the south, and South Breiel Road to the east. The land uses of the surrounding properties of AK Steel are depicted on Figure 4. Information on the parcels of the surrounding properties are presented on Figures 1 through 4 of Appendix E-14. The downtown section of the City of Middletown is located between 0.5 to 1 mile from the main gate of AK Steel.

The City of Middletown and the surrounding areas have been classified as a humid, temperate climate. The average precipitation is 37.54 inches per year based on precipitation records from the past 89 years at a regional climate station in Dayton, Ohio (NOAA, 2009). The average annual temperature is approximately 52 degrees Fahrenheit (°F). There are normally on average 8.4 days per year with 1 inch or greater of precipitation and an average of 135.5 days per year with precipitation of greater than 0.01 inches but less than 1 inch. The prevailing wind direction is south/southwest, based upon the wind rose diagram received from the Cincinnati/Northern Kentucky International Airport. The wind rose diagram is included in Figure 5.

The City of Middletown obtains potable water from the municipal well field located near the Hook Field Municipal Airport, which is approximately 4 miles northwest of AK Steel.

Land use in the vicinity of the site and adjacent waterways was reviewed to identify any sensitive subpopulations in the area. No concentrations of ethnic groups were identified that might receive atypical chemical exposures (e.g., groups likely to rely on subsistence fishing). The Amanda School is located near Dicks Creek; thus, recreational users of the creek may include children. No homes for the elderly have been identified in the vicinity of the site.

3.2.2 Geologic Framework

The following sections are a summary of the geologic and hydrogeologic features of the site that is further discussed in the Refinement of the Groundwater Flow Model (ARCADIS 2009) which was approved in a letter dated December 4, 2009 from U.S. EPA.

3.2.2.1 Geomorphology

The Middletown Works is located in the Till Plains section of the Central Lowland physiographic province (Fenneman, 1938). The topography was formed by multiple continental glaciations with the most obvious topographic features of the Middletown area as wide, flat valleys surrounded by well dissected bedrock uplands 100 to 300 feet above the valley floor. The wide flat areas are termed buried valleys and consist of deep, sediment filled, bedrock valleys formed by glacial outwash streams. AK Steel is situated at the intersection of two large buried valleys; the ancestral Miami River Valley and the ancestral Todds Fork River Valley (Appendix E-15, *Refinement of the Groundwater Flow Model*, *Figure 5-Bedrock Elevation Map*).

3.2.2.2 Regional Geology and Lithology

The following is a summary of the regional geology and lithology. For more detailed information, refer to the Refinement of the Groundwater Flow Model (ARCADIS, Inc. 2009) (Appendix E-15).

The bedrock which underlies the Middletown area consists of relatively flat lying Upper Ordovician limestone and shale of the Grant Lake Formation, the Fairview Formation and the Miamitown Shale and are within the Cincinnati Arch region (Slucher et al., 2006). This rock formation is a shallow sea deposit and outcrops in the southern portion of the Slag Processing Area. Following deposition, uplift and erosion of the bedrock resulted in the formation of a peneplain. A peneplain is a land surface worn down by erosion to a nearly flat plain. This peneplain was gradually dissected by northward flowing tributaries of the Teays preglacial drainage system, of which the ancestral Miami River valley and the Todds Fork River Valley are members. The pre-glacial alluvial deposits of the original Great Miami and Todds Fork streams were mainly fine sands with little gravel because of the low stream gradients present at the time.

The large groundwater supplies available in the vicinity of Middletown, Ohio are contained within valley fill aquifers of the ancestral Great Miami River Valley and the ancestral Todds Fork River Valley. The buried aquifer valleys in the vicinity of Middletown (Appendix E-15, *Refinement of the Groundwater Flow Model-Figure 5-Bedrock Elevation Map*) were cut deeply into the bedrock by preglacial rivers and streams. The sediment contained in these valleys consists of sand, sand and gravel, clay, silt, and clay and gravel. These glacially derived sediments include alluvial or stream deposits, glacial till, and lacustrine or lake deposits. Glacial till is a heterogeneous unstratified drift of all materials ranging from clay to large boulders (Bates and Jackson, 1984).

3.2.2.3 Surface Water and Drainage

Currently, the Great Miami River occupies the western edge of the ancestral Miami River Valley. Several dikes have been constructed in the river's floodplain about 1 mile from the facility to contain the river water in the event of a flood. Dicks Creek, a tributary to the Great Miami River, is currently the major stream of the ancestral Todds Fork River Valley. Dicks Creek drains into the Great Miami River, approximately 2 miles west of the plant. The North Branch of Dicks Creek is a tributary of Dicks Creek and lies immediately to the east of the South Plant. Shaker Creek is a tributary of Dicks

Creek and is located east of the Slag Processing Area. The surface water features and drainage patterns of AK Steel are presented on Figure 7.

Drainage in the vicinity of the plant ultimately discharges into the Great Miami River and Dicks Creek. Ground surface elevation at the confluence of Dicks Creek and the Great Miami River is approximately 620 feet above mean sea level (AMSL). The Dicks Creek watershed extends approximately 12 miles east of the Great Miami River, through Butler County, Lemon Township, and the City of Middletown and into Warren County and Franklin, Clear Creek, and Turtle Creek townships, an area of approximately 50 square miles. Dicks Creek has three primary tributaries: North Branch Dicks Creek; Shaker Creek; and Miller's Creek (a tributary to Shaker Creek). A small tributary, known locally as Monroe Ditch, traverses the southwestern portion of the Slag Processing Area and drains into Dicks Creek. Monroe Ditch is a drainage ditch/first-order stream that originates near State Route 63 and flows north through the Slag Processing Area (Tube City IMS) to its confluence with Dicks Creek east of Yankee Road. Dicks Creek runs along the northern boundary, approximately 100 feet north of the Slag Processing Area, and approximately 3 to 4 river miles east of the Great Miami River. The Miami Conservancy District channelized this stretch of Dicks Creek in 1966. The creek is approximately 30 feet wide and occupies an approximately 180-foot wide channel that has been filled during the past 35 years by unconsolidated, terraced fluvial sediment deposits that comprise the Dicks Creek floodplain. The channel along this stretch of the creek ranges from elevation 626 feet to elevation 629 feet. Grass, shrubs, and small trees are the only vegetation on the floodplain. The riparian corridor along this stretch of the creek was eliminated entirely during channelization. A storm event of 1 inch in 24 hours is typically sufficient to cause the creek to flood. During storms, water in the creek backs up behind the railroad trestle located approximately 50 feet west of the mouth of Monroe Ditch, so that this area floods before other portions of the creek in the stretch between the railroad trestle and the Slag Processing Area bridge located approximately one mile to the east (upstream). This condition is presumably related to the inability of the arches in the railroad trestle to easily transmit flood discharges (ARCADIS, Inc. 2002a).

3.2.2.4 Hydrostratigraphic Units

The unconsolidated deposits at AK Steel are complex and variable. The reworking and often complete removal of previously deposited sediment that occurred over and over has resulted in lithology so complex and diverse that it can be pictured only in its broad aspects with as much detail added as possible. The depiction of the site geology has been developed from numerous borehole logs, field study and literature review. All wells and boring logs used in this report are contained in Appendix D. Ten geologic cross-sections depicted in Appendix E-15, *Refinement of the Groundwater Flow Model-Appendix C*) illustrate local geology beneath AK Steel. The cross sections were interpreted using knowledge of glacial depositional environments in order to best illustrate the subsurface geology.

The following sections describe in detail the geology of the dominant hydrostratigraphic and discontinuous units at AK Steel. These hydrostratigraphic units are divided into five descriptive units: bedrock, upper aquifer, intermediate aquifer, lower aquifer and confining units. These primary aquifer units are delineated based on the presence of sand and sand and gravel units that are generally flat lying, but not aerially continuous across the glacial valley. These upper aquifer units may be partially saturated in specific areas. The actual yield from this unit is dependent on the actual saturated thickness. Two units (intermediate and lower aquifers) are the primary part of the aquifer system by having the capability of significant yield. Till or clayey sands are present in areas between aquifer units and in areas where the primary aquifer units pinch out. These units limit the hydraulic connectivity between aquifer units and are not high yielding formations and therefore are not classified as aquifer units.

3.2.2.4.1 Bedrock

The bedrock that underlies the entire Middletown area consists of relatively flat lying Upper Ordovician interbedded fossiliferous limestone and calcareous shale of the Grant Lake Formation, the Fairview Formation and the Miamitown Shale (Slucher et al., 2006). This rock formation deposited 450 million years ago is a shallow epicontinental sea and outcrops in the southern portion of the Slag Processing Area, south of GM-30S and GM-30D.

The groundwater occurs in the glacial deposits within the valleys incised in the bedrock; therefore, it is important that the bedrock structure is fully understood. The most current (top of) bedrock elevation data in feet AMSL is presented in Appendix E-15, *Refinement of the Groundwater Flow Model, Figure 5-Bedrock Elevation Map*). The bedrock elevation data was obtain from Ohio Division of Geological Survey and was last revised in 2004 (Ohio Division of Geological Survey, 2003). The bedrock elevation data was modified with newly installed borings that penetrate bedrock.

As discussed earlier, AK Steel is located near the intersection of the ancestral Todds Fork River Valley and the ancestral Great Miami River Valley. The northwest flowing ancestral Todds Fork River was once a tributary to the ancestral Great Miami River.

The river valleys were formed as part of the interglacial drainage system that developed in southwestern Ohio prior to the Illinoisan glaciations.

The most striking features of the ancestral drainage system, as seen on the bedrock elevation map (Appendix E-15, *Refinement of the Groundwater Flow Model, Figure 5-Bedrock Elevation Map)* are the steepness of the valley walls and the tight meandering pattern of the valleys. On the bedrock elevation map, the ancestral Great Miami River Valley can be seen north of the North Plant Area trending south and the turning in the vicinity of the Coil Paint Area to continue to the southwest. The ancestral Todds Fork River Valley intersects the ancestral Great Miami River Valley between the North Plant and the Melt Plant Areas. Two ancestral tributaries to the Todds Fork River Valley are visible in the bedrock elevation map.

Depth to bedrock ranges from zero, at the surface and outcrop, to great than 250 feet in the center of the valley. Overall, the ancestral Great Miami River Valley is slightly deeper than Todds Fork River Valley due to the greater erosional forces once present in the Great Miami River Valley. In both valleys, the walls are typically steep sided with the cut bank side of the meander the steepest. This is illustrated at recent boring W-2 (geologic cross-section D-D’) where this is a drop of approximately 140 feet over a distance of approximately 400 feet and is the cut side of the ancestral Great Miami River.

3.2.2.4.2 Perched Groundwater Zone(s)/Shallow Groundwater Zones

The perched groundwater zone(s) consists of the saturated portion of the fill layer in the south-central portion of the Slag Processing Area. In the fill layer, groundwater is encountered near the contact with the underlying upper clay layer (original surface topography prior to placement of fill for site development). The shallow groundwater zones are non-yielding units and laterally discontinuous (ARCADIS, Inc. 2002a).

3.2.2.4.3 Upper Aquifer

This unit generally is at depths up to 30 ft bls and ranges from approximately 3 to 13 feet thick. The upper aquifer mainly consists of sand with minor components of gravel and silt and lenses of clay, laminated clay and clay with gravel.

Aerially, the upper aquifer occurs only in the Melt Plant Area (central and southern sections), South Plant Area, and Slag Processing Area. In vertical profile the aquifer is usually capped with fill, topsoil, silty clay, or clay with gravel. The sands of the upper aquifer were deposited by relatively low energy streams following and possible during the late Wisconsin glacial period.

3.2.2.4.4 Intermediate Aquifer

The intermediate aquifer is the uppermost water yielding unit and is generally found at depths up to approximately 55 ft bls. The base of the aquifer, noted by its transition into a confining unit such as till, ranges from approximately 9 to 65 feet thick. In some cases the intermediate aquifer may be in direct communication with the lower aquifer. The saturated thickness of the intermediate aquifer is approximately 10 to 20 feet thick in most areas at the plant.

The intermediate aquifer is both a confined and unconfined aquifer depending on the location, overlaying lithology and degree of saturation of overlying units. In areas west of the North Plant Area, the intermediate unit is likely unconfined, whereas in the other areas of the plant the intermediate aquifer is confined to semi-confined.

Throughout the majority of the area the intermediate aquifer is quite variable. It is composed of mainly sand and gravel with minor components of sand and silt. It is most likely that the deposits of the intermediate aquifer were formed before, during and after the Wisconsin glacial period by glacial alluvial outwash, and non-glacial rivers and streams. Aerially, the intermediate aquifer is present throughout all of the areas of the plant except where shallower bedrock occurs.

3.2.2.4.5 Lower Aquifer

The lower aquifer is the deepest and the highest prolific aquifer unit at the site. AK Steel and other surrounding industries use the lower aquifer unit as part of their operations.

Throughout most of the plant, the top of the lower aquifer typically occurs at depths of 120 to 150 ft bls. In the South Plant Area, the lower aquifer occurs at more shallow depths of approximately 75 to 90 ft bls. The typical thickness of the lower aquifer is approximately 80 to 100 feet in the North Plant and the Coil Paint Areas, approximately 30 to 60 feet in the South Plant Area, and approximately 20 to 70 feet in the Slag Processing Area. The base of the lower aquifer is mainly clay with gravel (till) and laminated clay in some portions of the South Plant Area. These basal lower permeable units limit the interaction of the lower aquifer unit with the bedrock unit.

Lithologically, the lower aquifer is consistently formed of coarse sand and gravel with minor lenses of sand, silty sand and gravel. Clay with gravel (till) occasionally occurs within the lower aquifer.

Portions of the lower aquifer may have been formed from pre-glacial alluvial deposits of the ancestral Great Miami and Todds Fork Rivers. The majority of the aquifer may have been formed as glacial alluvial deposits during the Illinoisan glaciations and as high energy meltwater alluvial deposits during the interglacial times. Aerially the lower aquifer is present throughout the plant with the exception of certain areas of the Slag Processing Area and at the Melt Plant Area because of the occurrence of bedrock.

3.2.2.4.6 Confining Units

Clay with gravel (till) is predominant with lesser extents of clay and laminated clay at the site. These units have very low permeabilities and are not continuous across the plant. Generally in areas that do not contain fill, the near surface lithology is either thin topsoil underlain by silty clay, clay, or clay with gravel.

Clay with gravel (till) is a very poorly sorted deposit with varying amounts of sand and gravel. The deposition of the till occurs from glacial transport. Silty clay and clay mainly occurs at depths of 50 feet or less. Laminated clay is most common in the South Plant Area, north and north east of the Melt Plant Area and the Slag Processing Area. Laminated clay is typical of lacustrine deposits and is the result of lakes formed during recession of glaciers. Aerially the confining units are at all depths and areas at the site.

3.2.3 Groundwater Flow

Groundwater flow (potentiometric) maps for the upper, intermediate, and lower aquifers were developed and are presented in Appendix E-5 from 1996 through 2009. A summary of the 2009 site-wide semi-annual monitoring event is presented below.

3.2.3.1 Upper Aquifer

The upper aquifer unit is intermittent and is partially saturated in some areas northwest of the Melt Plant Area and North Plant Area and therefore data is not available (Appendix E-5, *Upper Aquifer, October 2009*). Based upon the subsurface conditions in October 2009, groundwater flow directions inferred from the South Plant Area groundwater levels indicate an inward direction centered along GM-42S and GM-37S, which indicates hydraulic control of the upper aquifer by groundwater withdrawals from the South Plant Area. As indicated in the Refinement of the Groundwater Flow Model (Appendix E-15) under typical pumping conditions (as depicted in the Slag Processing Area Simulated Capture in Model Layer 1 for December 2008 -Figure 19), Dicks Creek and portions of Shaker Creek appear to recharge the shallow water bearing unit(s). Portions of Shaker Creek and Dicks Creek in the vicinity of their confluence are generally losing water to the subsurface (but at times may be in gaining conditions). Dicks Creek transitions to a gaining stream south of the Melt Plant Area (white area depicting no capture-Figure 19). In the Melt Plant Area, groundwater flow is to the south and west towards Dicks Creek to which it ultimately discharges. Groundwater levels from the Slag Processing Area indicate groundwater flow from the west of the bedrock high (Appendix E-15, *Refinement of the Groundwater Flow Model, Figure 5-Bedrock Elevation Map*) is towards Monroe Ditch and Dicks Creek, and groundwater flow from east of the bedrock high is north towards Dicks Creek.

3.2.3.2 Intermediate Aquifer

Groundwater flow in the intermediate aquifer unit flows inward centered on GM-10S, GM-11S and GM-12SR indicating hydraulic control of this portion of the aquifer in the South Plant Area and Melt Plant Area (Appendix E-15, *Intermediate Aquifer, October 2009*). Groundwater flow south of Dicks Creek is both physiographically and hydraulically controlled due to bedrock valley walls and production well pumping, respectively. North Plant Area groundwater flow in the intermediate aquifer unit indicates flow to the west with depressed groundwater level contours wrapping to the north centered on pumping wells in the North Plant Area. As indicated in the Refinement of the Groundwater Flow Model, groundwater levels near the confluence of Dicks Creek and Shaker Creek also support the recharge from the upper aquifer unit and other water bearing units and both creeks.

3.2.3.3 Lower Aquifer

The lower aquifer unit potentiometric map illustrates a more limited aquifer extent as indicated by the bedrock contact lines (Appendix E-5, *Lower Aquifer, October 2009*). The lower aquifer shows predominant pumping centers in the North Plant Area, South Plant Area and southeast of the Melt Plant Area. Well defined cones of depression illustrate that groundwater is controlled by withdrawal centers under the North Plant Area and Melt Plant/South Plant Areas. Groundwater levels indicate that groundwater entering the lower aquifer unit flow towards the pumping centers. A hydraulic divide is produced near monitoring well MW-6-84 in the Melt Plant Area (Appendix E-15, *Lower Aquifer, October 2009*).

3.2.4 Groundwater Use

The Lower Great Miami River Valley has been studied extensively due to the essential resource of groundwater that the buried glacial valley aquifer system provides. An aquifer system as defined by OAC Rule 3745-27-01(A)(8) is one or more geologic unit(s) or formation(s) that is/are wholly or partly saturated with water is/are able to store, transmit and yield significant amounts of water to wells or springs. The buried valley aquifer system below AK Steel falls under this category and specific hydrogeologic units are capable of significant yield. The aquifer system at AK Steel is recognized as a Sole-Source Aquifer by the U.S. EPA by providing over 50% to drinking water.

The sources of groundwater include seepage from surface water features such as the Great Miami River and Dicks Creek, and infiltration of precipitation and anthropogenic sources such as irrigation. Sinks include groundwater pumping by local industry and municipalities, discharge to surface water features such as Dicks Creek and the Great Miami River, and evapotranspiration. The most significant sink in the groundwater system is AK Steel pumping withdrawals (Appendix E-15). The primary significant off-site pumping withdrawals are the City of Middletown, Wasau Paper Corp., and Magellan Aerospace Corp (ARCADIS, Inc. 2009).

AK Steel currently uses fourteen on-site production wells (22, 23, 27, 29, 30, and 34 through 42) for plant operations. They are located in the North Plant Area, Melt Plant Area, and South Plant Area (Figure 6). Appendix E-5 summarizes the amount of groundwater pumped from 1995 through 2009. A summary of the pumping recorded in the most recent report (Sitewide Groundwater Pumping and Flow Report (July through December, 2009) was:

- Third quarter of 2009: Production wells located in the North Plant Area and the Melt Plant/South Plant Areas extracted approximately 2.75 and 3.51 millions of gallons per day on average, respectively.

- Fourth quarter of 2009: Production wells located in the North Plant Area and the Melt Plant/South Plant Areas extracted approximately 3.00 and 4.42 millions of gallons per day on average, respectively.

A one mile radius well search was conducted from the boundaries of the plant. The Ohio Department of Natural Resources (ODNR) completed well surveys to physically locate wells in 1969, 1984, and 1988. The ODNR well logs for these years with location maps are included in Appendix D. An off-site well search was completed in 2010 using the ODNR Water Well Log polygon search tool on the ODNR internet website. The ONDR well logs for the 2010 search and location map are included in Appendix D.

3.2.5 Groundwater Quality

AK Steel implements three groundwater monitoring programs, where two of the programs monitor specific unit operations. USDW-01 groundwater quality program monitors the groundwater associated with the two deep injections wells HWMU 1 and HWMU 2. Landfill 1 (SWMU 43) groundwater quality program monitors the groundwater associated with the closed solid waste landfill. USDW-01 and Landfill 1 monitoring programs are discussed in Sections 3.1.1.9 and 3.1.1.10, respectively. The third groundwater monitoring program incorporates monitoring the groundwater quality, groundwater flow conditions, and pumping data from on-site production wells. Selected monitoring wells are sampled annually for VOCs, and water quality parameters (pH, temperature, and conductivity) (Figure 6). Historically, VOC constituents were detected in well GM-27S, located in the North Plant Area and in a series of wells in the Melt Plant Area associated with the coke oven gas release and the coal tar storage tanks. Groundwater quality from the coke oven gas release and well GM-27S is further discussed in Sections 3.1.1.5 and 3.1.1.7, respectively.

PCBs are present in the groundwater in the Slag Processing Area associated with past operations in this area. Further, PCB seeps were identified in the banks of Monroe Ditch and Dicks Creek. Groundwater quality from Slag Processing Area is discussed in Section 3.1.1.8.

3.2.6 Major Habitat Types

Middletown, Ohio lies within the Eastern Corn Belt Plains ecoregion, as identified by Omernik (1987). The Eastern Corn Belt Plains is primarily a rolling till plain with local end moraines. Originally, beech forests were common on Wisconsinan soils (glacial deposits), while beech forests and elm-ash swamp forests dominated the wetter pre-Wisconsinan soils. Today, extensive corn, soybean, and livestock production occurs and has affected stream chemistry and turbidity (U.S. EPA, 2002). The Ohio EPA uses ecoregion designations to determine aquatic biological criteria for fish and invertebrate community quality, as well as reference values for metals in sediment.

Major habitats associated with the site include the following:

- Dicks Creek and its tributaries
- Great Miami River
- Woodland areas

Each of these habitats is discussed below. National Wetlands Inventory data for the site are also discussed, although no wetlands are identified outside the Dicks Creek and Great Miami River riparian corridors.

3.2.6.1 Dicks Creek and Tributaries

A portion of Dicks Creek flows between the AK Steel plant and the Slag Processing Area, as noted in Section 3.2.2.3 and shown in Figure 7. The Dicks Creek watershed extends approximately 12 miles east of the Great Miami River and encompasses an area of approximately 50 square miles. Major tributaries include the North Branch of Dicks Creek (which flows from north to south adjacent to the AK Steel facility before joining the main branch of Dicks Creek at approximate river mile 5.3), Shaker Creek (which enters Dicks Creek at river mile 4.6), and Millers Creek (which flows into Shaker Creek a short distance upstream of its confluence with Dicks Creek). A small tributary, known locally as Monroe Ditch, traverses the southwestern portion of the Slag Processing Area and drains into Dicks Creek.

In the 1960s, much of Dicks Creek was channelized as part of the Miami Conservancy District flood control program. The channelization process involved widening, deepening, and straightening the natural channel of Dicks Creek and rerouting the North Branch of Dicks Creek to its current course. As a result of channelization, sediment deposition rapidly filled the excavated trapezoidal channel of Dicks Creek, creating an abbreviated floodplain, through which a narrower stream channel became incised (i.e., the existing low-flow channel). A more detailed description of Dicks Creek, Monroe Ditch, and associated streamside (riparian) habitat is provided in the *Interim Measures Remediation Work Plan* (ENVIRON, 2008a). Additionally, the *Focused Current Conditions Report* (Appendix F) contains a description of habitat conditions in Dicks Creek upstream of Reach 1.

3.2.6.2 Great Miami River

The Great Miami River drainage basin covers 5,385 square miles in southwestern Ohio and Indiana. The main stem of the river is 170 miles in length and drains to the Ohio River. Land use in the Great Miami watershed is primarily row-crop production of corn, soybeans, and wheat. Major urban areas in the watershed include Dayton and Cincinnati, Ohio (Debrewer et al., 2000; Ohio EPA, 1997). Use designations applicable to the Great Miami River in the Middletown area include Warmwater Habitat, Agricultural and Industrial Water Supply, and Primary Contact Recreation.

The RFI/CMS SOW specifies that the RFI will characterize the Great Miami River, as it relates to Outfall 011, between river miles 49.0 and 52.0. Figure 8 shows this area of interest. River mile 52.0 corresponds to a low head dam known as the Middletown Dam. AK Steel Outfall 011 discharges to the Great Miami River at river mile 51.4.[1] A former trestle is evident just upstream of the outfall, and a small, unnamed tributary discharges to the river just downstream and across the river from the outfall. Elk Creek flows into the Great Miami River at approximately river mile 49.8. Based on sampling conducted in 1995, the Ohio EPA rated the biological quality of Elk Creek as “exceptional” (Ohio EPA, 1997); thus, this tributary may contribute positively to the quality of the Great Miami River near its confluence. The downstream boundary of the area of interest (river mile 49.0) is located 0.1 mile downstream of the State Route 73 crossing. Downstream from the RFI area of interest, the Middletown WWTP discharges to the Great Miami River at river mile 48.2, and the Dicks Creek confluence is located at river mile 47.4.

Several combined sewer overflow outfalls (CSOs) discharge to the Great Miami River, both upstream and downstream of Outfall 011 (Figure 8). CSOs are recognized as a major source of various water pollutants, including microbial pathogens, oxygen-depleting substances, suspended solids, toxic chemicals, nutrients, and floatable debris (United States Environmental Protection Agency [U.S. EPA] 2004a). Because one of the CSOs is located immediately adjacent to (upstream of) Outfall 011, distinguishing the source of sediment quality impacts in this area is challenging.

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[1] The river mile designation of the outfall is based on Ohio EPA descriptions from 1995 and 2000. Ohio EPA planning documents for scheduled 2010 sampling indicate the outfall corresponds to a river mile designation of 51.3.

Land use adjacent to the Great Miami River area of interest is primarily urban and industrial to the east and agricultural to the west (Figure 8). Very little wooded riparian buffer is evident in most of the area of interest, except in the vicinity of Elk Creek. The National Wetland Inventory shows a 19.5-acre area of bottomland forest along the west bank of the river downstream of the Elk Creek confluence, and a 1.5-acre area of seasonally flooded shore along the east bank downstream of the State Route 73 crossing (Figure 9). Across the river from Elk Creek is a gravel mining operation, with several large quarry ponds.

In Ohio, aquatic habitat quality is typically rated using the Ohio EPA's (Rankin 1989) standardized Qualitative Habitat Evaluation Index (QHEI). The QHEI assesses a variety of stream attributes, including substrate type, siltation/embeddedness, type and amount of instream cover, channel morphology, riparian zone extent and quality, bank erosion, and pool, riffle, and run quality. High quality aquatic habitat is generally characterized by a high diversity of microhabitats, including a variety of velocity-depth combinations and substrate types and an abundance of instream cover (such as snags or overhanging banks). In contrast, modifications such as channelization tend to result in a homogeneous and exposed habitat that is suitable for fewer aquatic species. Aquatic habitat quality was evaluated in the Great Miami River by the Ohio EPA in 1995 and 2000; and by EA Engineering in 1998, 1999, and 2000 (Ohio EPA, 1997 and unpublished data; EA Engineering, 1999, 2000, 2001). Results obtained are summarized in Table 2 and indicate good to excellent aquatic habitat quality.

3.2.6.3 Woodland

Very little ecologically relevant terrestrial habitat is evident in the vicinity of the AK Steel facility. Most of the area is occupied by buildings, pavement, slag processing operations, or is routinely mowed. However, two wooded areas are large enough to constitute ecologically relevant habitat, as shown in Figure 10.

A 16-acre woodland is located between SWMU 42 (Closed Solid Waste Landfill East of Slag Processing Area Access Road) and Dicks Creek. This area may include both riparian and upland habitat types. Riparian habitat provides cover for organisms that use the adjacent stream as a source of food and water. Additionally, the high variability of soil properties and water regimes over short distances results in a high diversity of plant species and communities, which in turn are used by a wide variety of invertebrates and wildlife (Gregory et al. 1991). A functioning riparian zone also serves as a source of food and cover for aquatic organisms (in the form of fallen leaves and woody debris), decreases the severity of erosion and flood scour, and serves as a low-flow refugium for aquatic organisms during major floods (Sedell et al. 1990).

A 72-acre, largely wooded, upland area is located adjacent to SWMU 23 (Former Coil Paint Wastewater Treatment Lagoons). This wooded area is bisected by a road and appears to contain a high proportion of woodland edge habitat interspersed with open areas, based on aerial images. Most of this woodland lies outside AK Steel property.

3.2.6.4 National Wetland Inventory

Figure 11 shows National Wetland Inventory data for the vicinity of the AK Steel facility. Areas classified as wetlands are either industrial ponds or features which no longer exist (e.g., wetlands depicted on SWMU 43, where a maintained landfill cap is now present). Based on their design and use, industrial ponds are not intended or expected to support high-quality biological communities. Industrial ponds are not considered ecologically relevant features for the purposes of the RFI.

3.2.7 Plants and Animals

This section identifies plant and animal species observed or expected to occur in the habitats identified above. Descriptions of aquatic and terrestrial biological communities are provided below, followed by a discussion of threatened and endangered species.

3.2.7.1 Aquatic Life

Aquatic biological communities in Dicks Creek have been extensively studied, as documented by ARCADIS (2004a,c) and in the *Focused Current Conditions Report* (ENVIRON, 2005a; provided as Appendix F of this report). Fish and invertebrate community information for Dicks Creek is not repeated here, because Dicks Creek is subject to interim measures rather than an RFI investigation. Site-specific surveys of fish and invertebrate communities in the Great Miami River (river miles 49 – 52) are described below.

As noted in Section 3.1.1.13, fish and invertebrate communities in the Great Miami River were surveyed by Ohio EPA in 1995 and 2000; and by EA Engineering in 1998, 1999, and 2000. All of these surveys were conducted using standard procedures specified by Ohio EPA guidance (Ohio EPA 1989a; 1989b). In 2000, the most abundant fish species in the Great Miami River area of interest were spotfin shiners (*Cyprinella spiloptera*), golden redhorse (*Moxostoma erythrurum*), and smallmouth bass (*Micropterus dolomieu*). Golden redhorse was the most abundant large fish species. The Ohio EPA classifies this round-bodied sucker species as a specialized insectivore that is moderately intolerant of pollution. Seasonally migratory, it prefers pool habitat and requires clean gravel or cobble substrate for spawning (Ohio EPA 1988; Trautman 1981). The invertebrate community was characterized at most sample locations by a diverse assemblage of species, with abundant species representing mayflies (Ephemeroptera), caddisflies (Trichoptera), and midge larvae (Chironomidae). Mayflies and caddisflies are typically considered sensitive to water quality disturbance. The invertebrate community within the mixing zone of Outfall 011 and the adjacent CSOs was less diverse and was dominated by oligochaete worms and snails.

The Ohio EPA evaluates aquatic biological community quality using regionally calibrated biocriteria for fish (Index of Biotic Integrity [IBI] and modified Index of Well-Being [mIWB]) and invertebrates (Invertebrate Community Index [ICI]). Fish and invertebrate community indices from the Great Miami River surveys are summarized and compared to Ohio EPA biocriteria in Table 2. Background information on these indices is as follows:

- The IBI indicates fish community quality by incorporating 12 metrics that evaluate overall fish condition. Metrics include such variables as number of species collected, catch rate, the number of sunfish species, and the percentage of fish exhibiting external anomalies.

- The IWB indicates fish community quality more simply, through the incorporation of measured richness of nontolerant species, biomass, and abundance of fish. The mIWB is Ohio EPA's modification of the original IWB index developed for the Wabash River in Indiana.

- The ICI consists of ten individually scored structural community metrics, including total number of invertebrate taxa, percent tolerant organisms, and the relative abundance and taxa richness of Ephemeroptera, Plecoptera (stoneflies) and Trichoptera taxa (EPT). The scoring of each metric is based on comparisons to equivalent data from 232 reference sites in Ohio.

The biological index results for the Great Miami River show improvements over time. In 2000 (the most recent year for which data are available), full attainment of Ohio EPA biocriteria was observed at all sampling locations upstream and downstream of Outfall 011, with lower biological condition limited to the Outfall 011 mixing zone. The Ohio EPA does not evaluate aquatic life use attainment status for outfall mixing zones (Ohio

EPA, 1997). The Ohio EPA is next scheduled to conduct biological monitoring in the Great Miami River near Outfall 011 in 2010.

Aquatic vegetation has not been characterized in the Great Miami River, but it is likely that observations made in Dicks Creek are generally applicable. In the non-channelized portion of Dicks Creek, some areas contain small patches of curly pondweed (*Potomogeton crispus*) and water weed (*Elodea* spp.) in shallows directly downstream of riffles (ARCADIS 2004c). In the channelized area of Dicks Creek, the same species are present at greater densities, due to the 100% open canopy. Aquatic vegetation serves as both food and instream cover for fish and aquatic invertebrates and is also consumed by herbivorous wildlife (e.g., waterfowl).

3.2.7.2 Terrestrial Vegetation

Vegetation along Dicks Creek was characterized in 2004 with particular focus on Reach 2 (ARCADIS 2004c), as described below. Observations from this area are likely applicable to wooded habitat further upstream (e.g., between SWMU 42 and Dicks Creek) and along the Great Miami River (e.g., near the Elk Creek confluence). Vegetation in the upland, wooded area near SWMU 23 would not be expected to include the characteristic riparian species identified from Reach 2 of Dicks Creek. However, Amur honeysuckle (*Lonicera maackii*) and poison ivy (*Rhus radicans*), both noted in the Reach 2 area, have also been observed to be abundant near SWMU 23.

The tree layer adjacent to Reach 2 of Dicks Creek is dominated, in terms of count and size, by box elder (*Acer negundo*), sycamore (*Platanus occidentalis*), and American elm (*Ulmus americana*). Other less dominant tree species found throughout this habitat include characteristic bottomland species such as hackberry (*Celtis occidentalis*), persimmon (*Diospyros virginiana)*, musclewood (*Carpinus carolinana*), Ohio buckeye (*Aesculus glabra*), honeylocust (*Gleditsia triacanthos*), and several other species (ARCADIS 2004c). The upper canopy (approximately 120 feet high with 25% canopy closure) was dominated by the oldest and largest trees (sycamores and cottonwoods (*Populus deltoides*)) with an average basal diameter at breast height (DBH) of 32 inches. The middle canopy (approximately 75 feet high and 75% canopy closure) was dominated by trees ranging from 4 to 20 inches DBH, such as box elder, American elm, and the other less dominant trees mentioned above (ARCADIS 2004c). The lower canopy layer ranges in height from 4 to 20 feet and consists mainly (approximately 80%) of Amur honeysuckle, with the remaining 20% from sporadic occurrences of privet (*Ligustrum vulgare*), multiflora rose (*Rosa multifora*), and maple-leaf viburnum (*Viburnum acerifolium*) (ARCADIS 2004c). Among these species, only the viburnum is native to Ohio; the remainder are invasive exotic species. The Amur honeysuckle dominates the lower canopy layer and, when combined with the mid and upper canopies, blocks enough sunlight to eliminate undergrowth throughout much of the area.

The herbaceous layer is sparse throughout Dicks Creek Reach 2, with the exception of the fringes of the woods, where an interface niche of vegetation occurs between the closed canopy of the woods and adjacent fields. At these interfaces, wingstem (*Verbesina alternifolia*), green headed coneflower (*Rudbeckia laciniata*), and forest sunflower (*Helianthus decapetalus*) are found throughout the herbaceous stratum along the periphery of the entire wooded riparian buffer zone. The herbaceous stratum is diverse and also contains Joe Pye weed (*Eupatorium* spp.), blue vervain (*Verbena hastata*), clearweed (*Pilea pumila*), false nettle (*Boehmeria cylindrica*), ragweed (*Ambrosia artemisiifolia*), common dayflower (*Commelina communis*), great blue lobelia (*Lobelia siphilitica*), dame's rocket (*Hesperis matronalis*), and pale touch-me-not (*Impatiens pallida*), as well as numerous other herbaceous species not documented or identified because they were not flowering or were not evident at the time of the survey (e.g., ephemeral spring wildflowers) (ARCADIS 2004c).

Groundcover is present in the form of various twining and climbing vines. The dominant species in this stratum are the herbaceous vines Japanese hops (*Humulus japonicus*) and greenbrier (*Smilax* spp.) and the woody lianas Virginia creeper (*Parthenocissus quinquefolia*), river grape (*Vitis riparia*), and poison ivy. Wintercreeper (*Euonymus fortunei*), an escaped ornamental species, is also present in some areas. Though not ubiquitous, vines such as river grape and Virginia creeper dominate some trees as they creep into the canopy striving for sunlight. Japanese hops tends to stay sprawled closed to the ground, running over the herbaceous stratum. Poison ivy is present both as a ground cover and a climbing vine, even forming tree-like branches from the main trunks of host trees (ARCADIS 2004c).

Overall, the plant community in the wooded riparian zone is characterized by a high-quality tree community and a disturbed understory. The tree community is quite diverse with many sycamores and various slow-growing tree species. By comparison, dominance by fast-growing pioneer species such as silver maple (*Acer saccharinum*), cottonwood, and box elder would have been indicative of a formerly disturbed lowland hardwood forest (Hodges 1997). Invasive species are a significant problem in the shrub stratum, crowding out native shrubs, tree saplings, and herbaceous plants (ARCADIS 2004c).

3.2.7.3 Terrestrial Animals

Site-specific surveys of terrestrial animals have not been conducted along Dicks Creek or the Great Miami River. However, various animals and their signs have been observed in the Dicks Creek riparian corridor and floodplain during routine field work. Many of these species likely occur in other nearby habitats as well. Published surveys were also consulted to identify common vertebrate species expected to occur in the region, as summarized in Table 3. The small size of terrestrial habitat patches near the AK Steel facility and the proximity of intense human activity are expected to limit the occurrence of less-common species.

Terrestrial vertebrates include amphibians, reptiles, birds, and mammals. Frogs have frequently been observed along the banks of Dicks Creek. These may have included common species such as Blanchard's cricket frogs (*Acris crepitans*) or green frogs (*Rana clamitans*). Salamanders, though more reclusive, also likely occur in the area. A northern water snake (*Nerodia sipedon*), was observed swimming in Dicks Creek, and various other snake and turtle species may be present (Table 3).

Abundant bird life has been observed along Dicks Creek, including waterfowl, raptors, shorebirds, scavengers, and songbirds. Belted kingfishers (*Ceryle alcyon*) and great blue herons (*Ardea herodias*) have frequently been observed fishing from the creek, and swallows (Family Hirundinidae) have been observed capturing emergent insects above the creek. Goldfinches (*Carduelis tristis*) have been observed along the edge of wooded habitat, and the presence of woodpeckers (order Picidae) was indicated by holes in trees, as well as the sounds of woodpecker calls and hammering (ARCADIS 2004c). Hundreds of bird species pass through southwestern Ohio as migrants (OBRC, 2004); however, those most closely associated with habitats of interest are species which commonly breed in the area, shown in Table 3.

Mammal tracks, including those of beaver (*Castor canadensis*), opossum (*Didelphis virginiana*), and white tail deer (*Odocoileus virginianus*), were repeatedly observed up and down the creek banks (ARCADIS 2004c). Active beaver slides and burrows were observed in both banks, as well as dismantled vegetation along the northern shoreline and woods. The burrows could also have been from muskrats (*Ondatra zibethicus*), as immediate diagnostic tracks were lacking. Other animal tracks and scat were observed, suggesting the presence of raccoons (*Procyon lotor*) and another inconclusively identified mammal species (probably muskrat). Squirrels (*Sciurus* sp.) were observed in trees in the wooded area to the north of the creek (ARCADIS 2004c). Additionally, striped skunk (*Mephitis mephitis*) and red fox (*Vulpes vulpes*) were directly observed during recent ENVIRON field work. Other common mammals expected to occur in the Middletown area are listed in Table 3.

Terrestrial invertebrates are extremely diverse; ecological risk assessments typically focus on soil-associated species. Soil invertebrates form the base of the terrestrial food web, together with plants. Natural soils may contain more than 1,000 species of invertebrates. Detritivores and decomposers, which feed on decaying plant and animal material, are typically most abundant and include species such as springtails and mites. Other, larger species include earthworms, snails, and insects such as burrowing beetle grubs and fly larvae (Gorsuch et al., 2006).

3.2.7.4 Threatened and Endangered Species

A site-specific threatened and endangered species review was completed by the ODNR Natural Heritage Program in March 2010. The ODNR has no records of endangered species or species of concern in the area. There are also no existing or proposed state nature preserves or scenic rivers, unique ecological sites, geologic features, animal assemblages,, state parks, forests, or wildlife areas within a one mile radius of the project area.

The ODNR has one record of a state threatened species—the Peregrin Falcon (*Falco peregrinus*)—in the project area. The Peregrin Falcon is also listed as a federal species of concern. An individual Peregrine Falcon has been observed on-site. Peregrins are one of the most widespread birds of prey, feeding almost exclusively on medium-sized birds. “Peregrin” means wanderer, and they are known to often migrate long distances. They are found in a variety of habitats and prefer to nest on high cliffs along coastlines, rivers, and mountainsides. Increasingly, Peregrine Falcons are found in urban areas, where tall buildings provide suitable nesting sites.

Indiana bat (*Myotis sodalis*) is a federally and state endangered species that is expected to occur in Butler County. The Indiana bat hibernates in caves but forages along small stream corridors with well-developed riparian woods. The U.S. Fish and Wildlife Service (USFWS) indicates that Dicks Creek is within the summer range of the Indiana bat. However, the Indiana bat distribution is limited by its selection of hibernating caves (none of which are located in Ohio) and the susceptibility of those caves to human and natural disturbance. The USFWS has placed seasonal restrictions on the removal of suitable roost trees throughout the potential summer range of the Indiana bat; these restrictions are lifted if a site-specific bat survey identifies no Indiana bats.

Caddisflies of the genus *Hydroptila* were observed in the Great Miami River, based on aquatic survey results. Five species of *Hydroptila* have been listed by the State as threatened species, and one species of *Hydroptila* is a State species of concern. However, a total of 17 *Hydroptila* species are known to occur in Ohio. Because the (aquatic) larvae of this genus have not been fully characterized, specimens cannot be reliably identified to species based on the aquatic life stage (J. Keiper, Cleveland Museum of Natural History, pers. comm.).

3.2.8 Preliminary Human Health Site Conceptual Model

Based on information regarding land and groundwater use at and around the site described in the sections above, a preliminary identification of potentially exposed populations under current and reasonably expected future land use was completed as summarized on Table 4. Future land use within the current facility boundaries is expected to remain industrial and/or commercial; environmental covenants prohibiting other uses of the property will be submitted consistent with this assumption. This section focuses on potential receptor populations and exposure pathways, drawing on information regarding potential source areas and migration pathways as described further in Section 7.2.

The potential receptor populations identified on Table 4 include:

On-Site: Routine Workers
Maintenance Workers
Trespassers

Off-Site: Residents
Routine Workers
Maintenance Workers
Recreational Users

The main on-site receptor population at current operational areas of the site consists of "routine workers," who typically spend most of the work day indoors conducting industrial activities. Potential exposure of routine workers is assumed to include incidental ingestion and dermal contact with exposed surface soil and inhalation of (1) vapors and particulates from surface soil, (2) vapors from subsurface soil and groundwater that migrate into outdoor air, and (3) vapors from groundwater and subsurface soil that migrate through building foundations into indoor air. Groundwater at the site is not currently used for potable purposes but may be used for potable purposes in the future. Potable water is currently provided to the site by the City of

Middletown via well fields located 2 miles northwest of the site but there are no restrictions currently that would prevent groundwater from being used at the site for potable purposes. The site currently pumps about 3-8 million gallons per day of groundwater from the lower aquifer for nonpotable manufacturing uses. As such, potential exposure of routine workers to groundwater via potable and nonpotable uses is assumed to include incidental ingestion, dermal contact, and inhalation of vapors.

A small fraction of the workers ("maintenance workers") at the site conduct occasional subsurface construction or maintenance activities (i.e., installation or repair of underground utilities, or removal or repair of pavement). Some maintenance workers may also conduct occasional maintenance in storm water management areas, ditches, lagoons, outfalls, closed landfills and ponds. Construction/maintenance activities are currently covered by the site's Health and Safety Policy, which includes provisions designed to protect construction/maintenance workers against the potential for significant exposures during such activities. However, if in the future, such policies were not maintained, maintenance worker exposures to soil, shallow groundwater, leachate, waste, NAPL, sediment and surface water would be possible on-site. Potential exposure of maintenance workers is assumed to include (1) incidental contact ingestion and dermal contact with surface and subsurface soil, shallow groundwater (during excavations that extend into groundwater), NAPL, leachate, waste, surface water, and sediment in the on-site ditches, lagoons, outfalls, closed landfills and ponds; (2) inhalation of airborne particulates and vapors from surface and subsurface soil; and (3) inhalation of vapors from groundwater, NAPL, leachate, waste and surface water.

Potential exposure of trespassers is assumed to include (1) incidental ingestion and dermal contact with surface soil, surface water, and sediment; and (2) inhalation of airborne particulates from surface soil, and vapors from surface and subsurface soil, groundwater, surface water, and sediment.

The potentially exposed populations in off-site areas include residents, routine workers, maintenance workers, and recreational users. No off-site soil contamination has been identified. However, historical deposition of dredge spoils in limited off-site areas may have occurred such that site-related impacts may exist in off-site soil. In addition, site-related groundwater contamination has not been identified off-site. In the future, off-site groundwater exposures to site-related contamination may occur if site-related contamination were to migrate off-site. Potable water is provided in this area by the City of Middletown via well fields 2 miles northwest of the site, and while groundwater off-site is not currently believed to be used for potable purposes, there are no current restrictions in place which would prevent off-site groundwater from being used for potable purposes in the future. In addition, a number of off-site wells have been identified and the specifics regarding their current use is not yet available. At this time, given the availability of City water in the area, it is believed that these off-site wells are used for only nonpotable residential purposes.

In the event that on-site groundwater contamination were to migrate to off-site areas in the future, potential exposure of off-site residents is assumed to include ingestion, dermal contact, and inhalation during potable (if any) and non-potable residential uses of groundwater. Off-site residents may also be potentially exposed to airborne particulates from on-site soil and/or vapors from on-site soil and groundwater. Off-site residents could also be exposed to vapors from groundwater that migrates through building foundations into indoor air. Finally, potential exposure of residents in areas where historical deposition of dredge spoils occurred is assumed to include incidental ingestion and dermal contact with exposed surface soil and inhalation of (1) vapors and particulates from surface soil, (2) vapors from subsurface soil that migrates into outdoor air, and (3) vapors from subsurface soil that migrate through building foundations into indoor air.

Occasional exposure of recreational users to surface water, sediment, and floodplain soil downstream from the site may be possible. Children, adolescents, and/or adults may visit Dicks Creek or the Great Miami River to walk, picnic, or play along the banks and/or floodplain and/or wade or swim. In general, potential exposure of recreational users is assumed to include (1) incidental ingestion and dermal contact with surface soil (flood plain soil), surface water, and sediment, (2) inhalation of airborne particulates from surface soil, vapors from surface and subsurface soil, surface water, and sediment; and (3) ingestion of fish caught from Dicks Creek or the Great Miami River. Ohio EPA has issued a "DO NOT EAT" fish advisory for Dicks Creek. However, limited consumption of fish caught from Dicks Creek through occasional fishing may be possible. Ohio EPA has also issued a limited "DO NOT EAT" fish advisory for the Great Miami River recommending that certain fish species ("ALL SUCKERS") not be consumed and recommending that other species of fish only be consumed on a limited basis. Despite the fact that fishing activity in the Great Miami River is expected to be limited, the consumption of fish caught from the River through occasional fishing is assumed to be a current and reasonably expected future exposure pathway.

In areas where exposure pathways are potentially complete, chemicals of potential concern will be identified by comparing concentrations detected in relevant media with the screening values identified in Attachment 4 of the Consent Decree. Such identification would also consider background levels, detection frequency, and essential nutrient status.

3.2.9 Preliminary Ecological Site Conceptual Model

The objectives of the ecological risk evaluation for the Facility are to identify significant risks of adverse effects on ecological resources at the site (if any), and to develop risk-based clean-up levels where potentially significant ecological risks exist. Potential ecological risks will be evaluated for areas of the site where (1) ecologically relevant habitat is present (Section 3.2.6 and 3.2.7), and (2) site activities could potentially have resulted in chemical contamination. The potential role of non-habitat areas as sources of contamination to areas of ecologically relevant habitat will be incorporated in the assessment, based on the evaluation of ecological risks in areas of the site that contain ecologically relevant habitat.

Ecological components of the preliminary conceptual site model for the Great Miami River, Dicks Creek, Monroe Ditch, and woodland habitat are described in the following subsections. Although Dicks Creek and Monroe Ditch are subject to interim measures rather than an RFI investigation, they are included here because groundwater migration to these streams is possible from certain SWMUs and AOCs. The ecological conceptual site model includes the identification of exposure pathways, receptors of interest, and assessment endpoints, as well as a discussion of the approach for identifying chemicals of potential ecological concern (COPECs).

3.2.9.1 Exposure Pathways

Pathways by which ecological receptors may be exposed to chemicals of interest include direct contact with water (i.e., absorption from water by gills, dermal uptake from water), dermal uptake from soil or sediment, surface water ingestion, soil or sediment ingestion, and ingestion of food (i.e., plant and animal tissue). Figure 12 shows the relationship between these possible exposure pathways and the evaluation methods available for ecological risk assessment. For aquatic and soil-dwelling organisms, all exposure pathways are integrated by comparing surface water, sediment, soil, or tissue concentrations (as appropriate) to toxicological benchmarks for the respective exposure medium. For wildlife, doses obtained through ingestion of surface water, soil or sediment, and food are directly calculated for each exposure pathway and summed for comparison to toxicity benchmarks. Data are not available to directly assess dermal exposures for wildlife; however, this is not considered a significant data gap, because dermal exposures are expected to be much less important than ingestion due to the protective effects of fur and feathers. The assessment of amphibians and reptiles is also limited by the availability of appropriate toxicological data.

Site-specific exposure pathways and receptors are described as follows.

- Great Miami River – The only site-related source of constituents to the Great Miami River is permitted and unpermitted discharges through Outfall 011 (unpermitted discharge refers to any permit exceedances). Within the river, chemicals partition between surface water and sediment, which in turn serve as exposure media for ecological receptors. Aquatic receptors include fish and benthic invertebrates. Wildlife receptors are those which feed on fish and benthic invertebrates. Fish and benthic invertebrates are exposed directly to surface water and sediment and may also ingest contaminated prey. For aquatic-feeding wildlife, prey ingestion serves as the primary exposure route for bioaccumulative constituents, although incidental exposure can also occur via ingestion of sediment and water.

- Dicks Creek and Monroe Ditch – In addition to historical releases, constituents may enter Dicks Creek and Monroe Ditch through surface runoff from adjacent land, groundwater migration (from areas outside the capture zone of on-site production wells), and permitted and unpermitted discharges through several outfalls to Dicks Creek. Within Dicks Creek and Monroe Ditch, exposure pathways and receptors are as described above for the Great Miami River.

- Woodland habitat – Woodland habitat is present in two areas, adjacent to SWMU 23 (Former Coil Paint Wastewater Treatment Lagoons) and SWMU 42 (Closed Solid Waste Landfill East of Slag Processing Area Access Road). However, this CCR has determined that SWMU 42 does not require further evaluation (see Section 6.6). Therefore, only the wooded area adjacent to SWMU 23 is considered here. Constituents may be present in surface soil of woodland habitat due to surface runoff and/or aerial deposition from SWMU 23 soils. Receptors that are exposed primarily through direct contact with soil are soil invertebrates and plants. Wildlife receptors include herbivores (e.g., mourning dove, meadow vole), invertivores (e.g., American robin, short-tailed shrew), and carnivores (e.g., American kestrel, red fox). Wildlife receptors are exposed via prey ingestion, as well as incidental soil ingestion.

3.2.9.2 Receptors of Interest

It is not feasible to complete ecological risk calculations for all species occurring in the vicinity of the site. Such an effort would also be duplicative because of the similarity of exposure patterns among closely related species and those with like feeding guilds. For these reasons, representative receptors of interest are selected for quantitative risk assessment purposes. The selected receptors are representative of entire classes of organisms (i.e., functional groups).

For aquatic habitat, however, receptors of interest are identified on a more general basis, for the purposes of this CCR. Risk assessments for Monroe Ditch and Dicks Creek are not anticipated, because these streams are subject to interim measures. The existing data for the Great Miami River suggests that fish and invertebrate communities are not adversely affected outside the Outfall 011 mixing zone (Section 3.2.7.1), and that chemical concentrations in fish tissue are similar upstream and downstream of the outfall (Section 3.2.10.4). The Ohio EPA is scheduled to collect additional data from the Great Miami River in 2010, and more specific receptors of interest may be identified in the future if needed. For this CCR, the receptors of interest for the Great Miami River are identified to reflect the existing screening-level analysis, as follows:

- *Benthic invertebrates* – The benthic invertebrate community lives in constant and direct contact with surface sediment that may be impacted by COPECs. Invertebrates have vital functions within the ecosystem, including serving as a prey base for higher trophic level organisms and cycling of nutrients.

- *Fish* – The fish community lives in constant and direct contact with surface water that may be impacted by COPECs. Exposures are also possible via sediment and the food chain (i.e. secondary consumers). The fish community often dominates perennial aquatic ecosystems, in terms of biomass, and fish serve as a prey base for piscivorous wildlife.

- *Aquatic-Feeding Wildlife* – A variety of birds, such as kingfishers, herons, ducks, and swallows, consume fish and invertebrates from aquatic habitat. The number of mammalian species feeding from aquatic habitat is more limited and includes such species as mink and raccoons. Wildlife populations can be the most highly exposed and sensitive receptors for bioaccumulative compounds.

These receptors are collectively considered representative of exposures that may be encountered by amphibians, reptiles, and water column-dwelling invertebrates. Indeed, the water quality criteria used to assess risks to fish explicitly include toxicity data for invertebrates, as well as for amphibians in many cases. Relevant toxicological data for reptiles in the scientific literature are extremely limited (Sparling et al. 2000). It is reasonable to expect that fish, birds, and mammals are equally or more highly exposed to potential COPECs than reptiles, because their feeding preferences and contact with environmental media are similar. Also, a comparison of toxicological sensitivity for five chemicals (azinphos methyl, malathion, methyl parathion, ethyl parathion, and sodium monofluoroacetate) indicates that assessments of birds and mammals are protective of reptiles (Arenal et al. 2000). Potential risks to reptiles in the Great Miami River are thus evaluated indirectly through the assessment of other receptors.

For woodland habitat, chemical concentrations in soil have not been characterized, and it is not known whether bioaccumulative chemicals may be of potential concern. Therefore, specific terrestrial wildlife species (birds and mammals) are identified as part of the SCM (Site Conceptual Model), in addition to soil-associated receptors. These receptors collectively serve as surrogates for amphibians and reptiles, as described above for the Great Miami River. Receptors identified for woodland habitat are as follows:

- *Soil invertebrates* – Soil-associated invertebrates, such as earthworms, live in constant and direct contact with surface soil that may be impacted by COPECs. The soil invertebrate community influences the suitability of soils for various plant species and serves as a prey base for higher trophic level organisms.

- *Plants* – Plant roots are in constant and direct contact with soil that may be impacted by COPECs. Plant communities provide food for herbivores and essential habitat for many animal species.

- *American robin (Turdus migratorius)* – The American robin is selected to represent the invertivorous bird feeding guild. The American robin feeds primarily on worms and other terrestrial invertebrates. Robins are common throughout the United States during the breeding season and inhabit moist forests, swamps, and open woodland (U.S. EPA 1993).

- *Short-tailed shrew (Blarina brevicauda)* – Short-tailed shrews represent the invertivorous mammal feeding guild. Short-tailed shrews feed primarily on soil invertebrates such as earthworms and slugs (U.S. EPA 1993). Shrews prefer cool, moist locations (U.S. EPA 1993).

- *Mourning dove (Zenaida macroura)* – Mourning doves represent the herbivorous bird feeding guild for terrestrial areas. Mourning doves are almost exclusively herbivores, consuming mostly seeds. Exposure parameters for mourning doves were identified as part of the development of the U.S. EPA's Ecological Soil Screening Levels (U.S. EPA, 2005). Mourning doves are more likely to occur in the woodland habitats of interest than the herbivorous bird species (e.g., quail) included in the U.S. EPA's Wildlife Exposure Factors Handbook (U.S. EPA, 1993).

- *Meadow vole (Microtus pennsylvanicus)* - Meadow voles, primary consumers representing the herbivorous mammal feeding guild, are found over most of the northern half of the United States (U.S. EPA 1993). Meadow voles prefer grassy habitat in moist to wet areas (U.S. EPA 1993). Voles often constitute a major portion of the diet of some carnivorous birds and mammals (e.g., raptors, mink).

- *American kestrel (Falco sparverius)* - The American kestrel is selected to represent the carnivorous bird feeding guild. Kestrels nest in tree cavities and prefer woodland edges and open areas such as grasslands, old fields, and marshes (Brewer et al. 1991). They are found in areas with human activity more often than other raptors. Kestrels feed on insects, amphibians, reptiles, birds, and mammals (U.S. EPA 1993).

- *Red fox (Vulpes vulpes)* - Red foxes are top-level carnivores and are selected to represent the carnivorous mammal feeding guild. They are the most widely distributed carnivore in the world, and they have been observed on-site. Red foxes prefer broken, varied habitat (U.S. EPA 1993).

3.2.9.3 Assessment Endpoints

Assessment endpoints are explicit expressions of the environmental value that is to be protected, operationally defined by an ecological entity (e.g., fish, birds, mammals) and its attributes (e.g., community structure, survival, growth, reproduction). Assessment endpoints are selected based on ecological relevance, susceptibility (which is a combination of toxicological sensitivity and potential for exposure), and relevance to management goals.

The following assessment endpoints are selected for the Great Miami River and woodland habitat areas:

- Fish community structure and function;
- Invertebrate community structure and function, including benthic and soil invertebrates, where applicable;
- Plant community structure and function; and
- Survival and maintenance of wildlife populations (including birds, mammals, amphibians, reptiles).

“Community structure and function” refers to the types and diversity of species present and their ecological roles (e.g., serving as prey for wildlife). Community structure and function generally does not depend on the presence or absence of any single species. “Population” refers to a group of interbreeding individuals of a single species, occurring within a geographic area.

3.2.9.4 Chemicals of Potential Ecological Concern

Maximum chemical concentrations detected in Great Miami River surface water, sediment, and fish tissue are evaluated in Section 3.2.10 based on comparisons to ecological and human health screening values. Ecological screening values are identified primarily from the following sources:

- U.S. EPA’s (2003) Region 5 Ecological Screening Levels (ESLs), and
- Ohio EPA’s water quality criteria.

In cases where screening values were not available from these sources, additional sources were consulted, as described further in Section 3.2.10.1. Supporting documentation for the screening values used in this CCR is provided in Appendix G.

Chemicals of potential ecological concern will be identified for woodland habitat in a Screening Ecological Risk Assessment (SERA), based on chemical concentrations in surface soil. Initially, the SERA will compare maximum detected chemical concentrations with the screening values identified in Attachment 4 of the Consent Decree (i.e., Eco SSLs and Region 5 ESLs). Subsequently, the identification of

COPECs will be refined, in accordance with U.S. EPA (2001) guidance, considering factors such as comparisons to background concentrations, detection frequency, essential nutrient status, and additional toxicological information. This refinement step will support effective determination of additional sampling needs, if any.

3.2.10 Great Miami River Water and Sediment Quality and Fish Tissue Assessment

The purpose of Ohio EPA's biological, chemical, and physical monitoring was to (1) determine the extent to which use designations assigned in the Ohio Water Quality Standards are either attained or not attained;(2) determine if use designations assigned to a given water body are appropriate and attainable; and (3) determine if any changes in key ambient biological, chemical, or physical indicators have taken place over time, particularly before and after the implementation of point source pollution controls or best management practices (Ohio EPA ,1997)." The EA assessments (EA, 1999; 2000; 2001) were conducted to obtain data to compare to the Ohio EPA results. It is assumed that Ohio EPA followed appropriate quality assurance procedures for its sampling and analyses. EA followed Ohio EPA guidance and methodology for assessing QHEI, IBI, and mIWB; while this type of sampling is not typically conducted under a QAPP, EA's personnel were trained in the sampling methodology by Ohio EPA. EA's water quality data (EA, 2000; 2001) are not used for screening purposes in this report due to a lack of documentation. The 1995-1999 data from Ohio EPA and EA are relatively outdated, but use is justified in order to fill gaps in more recent (2000) data. The Ohio EPA is planning to collect data in 2010 that will support further characterization of the Great Miami River area of interest.

3.2.10.1 Great Miami River Screening Assessment

To assess the need for further evaluation, chemicals that were detected in Great Miami River surface water, sediment, or fish tissue are compared to appropriate ecological and human health screening levels. Screening levels are chemical concentrations in environmental media below which there is negligible risk to receptors exposed to those media. These simple, highly conservative comparisons are sufficient to eliminate many chemicals from further evaluation. Chemicals that are not eliminated through the screening assessment may be evaluated further to determine whether additional data will be needed to fully characterize ecological or human health risks.

For this screening assessment, maximum detected concentrations are compared to screening values. Maximum detected concentrations are identified separately for the portions of the Great Miami River upstream and downstream of AK Steel Outfall 011.

However, due to the proximity of several CSOs, chemical present at higher concentrations downstream of Outfall 011 may or may not be associated with Outfall 011. Screening values and results are described below for chemicals detected in surface water, sediment, and fish tissue. In addition, effluent toxicity test results are summarized. Effluent chemistry monitoring results are provided in Appendix E-12 but are not evaluated in this section, because effluent concentrations are not directly comparable to surface water screening values.

3.2.10.2 Surface Water

Surface water screening values for detected chemicals are identified from the following sources (Table 5):

- U.S. EPA (2003) Region 5 Ecological Screening Levels (ESLs). Note that these values do not account for site-specific effects of hardness on metals toxicity.

- Ohio EPA aquatic life Outside Mixing Zone Average (OMZA) water quality criteria for the Ohio River drainage basin. For hardness-dependent metals criteria, values are calculated based on the average of hardness (312 mg/L as $CaCO_3$) measured in Great Miami River surface water between river miles 51.5 and 49.27. The criterion for ammonia is calculated based on the average pH (8.4) and temperature (24°C) of this area.

- Ohio EPA human health non-drinking water quality criteria.

For certain chemicals detected in surface water, none of the above sources included a screening value or criterion. In these cases, screening values were identified from U.S. EPA sources or from the Michigan Department of Environmental Quality's water quality values (derived in accordance with U.S. EPA's Great Lakes Initiative methodology). Sources of all screening values are listed in Table 5.

The maximum concentrations of five chemicals (aluminum, iron, lead, total dissolved solids, and total phosphorus) exceed at least one screening value both upstream and downstream of Outfall 011. The maximum copper concentration exceeds a screening value only upstream of the outfall. The maximum concentrations of six chemicals, including aldrin, ammonia, dieldrin, hexachlorobenzene, pH, and total Kjeldahl nitrogen, exceed at least one screening value downstream of Outfall 011, but not upstream. As noted above, these chemicals are not necessarily associated with Outfall 011, due to the presence of CSOs upstream and downstream of the outfall (Figure 8).

3.2.10.3 Sediment

Sediment screening values for detected chemicals are identified from the following sources (Table 6):

- U.S. EPA's (2003) Region 5 ESLs. The ESLs are intended to be protective of both aquatic life (including benthic organisms) and aquatic-feeding wildlife. Note that many of the ESLs for metals are at or below naturally occurring background concentrations, reflecting their highly conservative derivation.

- Ohio EPA's (2003) Ohio-specific sediment reference values (SRV) for naturally occurring metals in the Eastern Corn Belt Plains ecoregion. These values represent the upper range of metal concentrations measured at reference sites identified by Ohio EPA as minimally impacted (both chemically and biologically). Based on this derivation, the SRVs represent both background concentrations and a lower limit of biologically acceptable concentrations (i.e., effects thresholds may be higher but should not be lower than the SRVs under normal geochemical conditions).

Sediment data for the Great Miami River between river miles 49 and 52 is available only from Ohio EPA's 1995 sampling event (Ohio EPA, 1997). The screening evaluation is limited to two samples: one collected approximately 1.2 miles upstream of Outfall 011 and one approximately 0.1 mile downstream of the outfall. Screening comparisons are provided in Table 6. Two chemicals exceed sediment criteria at the upstream location: dieldrin and fluoranthene. In the single sediment sample collected in 1995 downstream from Outfall 011, concentrations of 29 chemicals exceeded one or both screening values, including metals, PAHs, and pesticides. No PCBs were detected in this sample.

3.2.10.4 Fish Tissue

Fish tissue data are available from an Ohio EPA sampling event conducted in 1998 (unpublished data). Fish tissue results are composite fillet samples reported on a wet weight basis. To facilitate comparisons to screening values, total DDT values were calculated by summing the concentrations of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT, including both detected and non-detected values, where the detection limit was used. Total chlordane values were calculated by summing the concentrations of alpha-chlordane, trans-gamma-chlordane, cis-nonachlor, trans-nonachlor, heptachlor, and oxychlordane, including both detected and the detection limit of non-detected values. Total PCB values were determined by summing detected Aroclors in each sample.

The U.S. EPA Region 5 ESLs do not include values for fish tissue. Fish tissue screening values are identified from the following sources (Table 7):

- Human health screening values are identified from the State of Ohio (2008) fish consumption advisory trigger levels, specifically the upper limits for unrestricted human consumption.

- Ecological screening values for total DDT, mercury, and PCBs are derived from U.S. EPA's (1995) Great Lakes Water Quality Criteria for Piscivorous Wildlife. The water quality criteria are multiplied by the trophic level 4 bioaccumulation factors used in the original criteria derivation (U.S. EPA 1995) to identify fish tissue screening values. Trophic level 4 bioaccumulation factors are appropriate for this screening exercise based on the types of fish sampled by Ohio EPA in 1998.

- The U.S. EPA's (2004) Draft Aquatic Life Water Quality Criterion for Selenium is expressed as a fish tissue concentration and is used as the ecological screening value for selenium.

- For the remaining chemicals detected in fish tissue (total chlordane, dieldrin), the University of Tennessee (2009) Risk Assessment Information System Ecological Benchmark Tool was queried to identify supplemental ecological screening values for fish tissue. Screening values for these two pesticides are available from the New York Department of Environmental Conservation's Noncancer Criteria for Piscivorous Wildlife (Newell et al. 1987).

The ecological screening values are comparable to chemical concentrations in whole fish; however, they are compared here to fillet data because whole-body data are not available. For most chemicals, concentrations tend to be higher in whole fish than in fillets, although the reverse is true for mercury. The lack of whole-body fish tissue data thus represents a data gap for the Great Miami River area of interest.

Concentrations of dieldrin, selenium, total chlordane, and total DDT are below the human health and ecological screening values. Concentrations of mercury and total PCBs in fillet exceed the human health and ecological benchmarks both upstream and downstream of Outfall 011.

Spatial trends in fish tissue concentrations are shown in Figure 13, for species sampled both upstream and downstream of Outfall 011. This figure shows individual sample results in most cases, except that results for downstream samples were averaged for smallmouth bass and for the hybrid sauger walleye. In cases where one result was non-detect, the detection limit was used to calculate the average. In general, the 1998 chemical concentrations in fish tissue are similar upstream and downstream of Outfall 011. Downstream concentrations tend to be slightly higher than upstream for selenium, but all selenium concentrations are well below the human health and ecological screening values. The existence of upstream sources of PCBs is well established, as the Ohio EPA has published fish consumption advisories due to PCBs in Great Miami River fish for the entire area between Dayton and the Route 73 crossing near Middletown (http://www.epa.ohio.gov/portals/35/fishadvisory/2010NewFishAdvisories.pdf). PCBs were not detected in sediment or surface water in the RFI area of interest, although the extent of sampling was limited.

3.2.10.5 Outfall 011 Effluent Toxicity

AK Steel routinely monitors the acute (short-term) aquatic toxicity of Outfall 011 effluent (prior to discharge) and upstream Great Miami River water, in accordance with effluent discharge permit requirements. The permit requires toxicity monitoring but does not contain a specific toxicity limit. Toxicity test results for 2005 through 2009 are summarized in Table 8. No detectable toxicity was observed in 17 of 19 effluent toxicity tests during this period, and mortality exceeding 50% in undiluted effluent was observed only in March 2005. The Great Miami River receiving water was not acutely toxic in any of the tests.

In addition, Ohio EPA has tested Outfall 011 effluent for acute toxicity on four occasions in 2000, 2007, and 2008 (Table 8). Samples from the upstream receiving water and from the acute mixing zone were also tested. The effluent and acute mixing zone samples were found to be toxic in the October 2007 samples only. The Great Miami River receiving water was not toxic.

4. Description of Interim/Stabilization Measures

The following section presents the Interim/Stabilization Measures from past releases/spills and site investigations, pursuant to Attachment 2 RFI/CMS SOW of the Consent Decree. Specifically, a summary of mitigation controls (human health exposure and releases into the environment), applicable permitting, design, construction, operation and maintenance (O&M) requirements, and a description of groundwater capture from plant pumping are presented below. Lastly, a summary of the Consent Decree Interim Measures are also presented.

4.1 Release Response Measures

The following sections present a summary of the releases/spills response measures at Middletown Works.

4.1.1 Diesel Fuel Releases

There were three diesel fuel releases that were previously discussed in Section 2.6.1. Two diesel fuel releases were located in the North Plant Area, and one diesel fuel release was located in the Melt Plant Area. The diesel fuel release locations are presented on Figure 1 of Appendix E-1.

During each release, interim/stabilization measures were implemented to limit exposure to human health and control impacts to the environment. Mitigation controls to protect human health included monitoring explosive atmospheric conditions, and utilizing emergency response/clean-up personnel that are trained for handling the type of material(s) that were released. Further, material safety data sheets (MSDS) were available for all the materials that are managed at the plant in AK Steel's SPCC Plan. Mitigation controls to protect the environment included recovering free liquids (diesel fuel), installing interceptor trenches, applying absorbent material, and/or excavating impacted soils.

Based on Figures 15 (Site-wide Area), 16 (North Plant Area), and 17 (Melt Plant Area), groundwater is simulated to be captured in the diesel fuel release areas.

4.1.2 Coke Oven Gas Pipeline Release

The coke oven gas pipeline release was previously discussed in Section 2.6.2. A release of coke oven gas into the subsurface from a leak in the distribution line was determined, after elevated carbon monoxide levels were recorded in two homes located west of the pipeline in Melt Plant Area. The coke oven gas pipeline release location is presented on Figure 2 of Appendix E-1.

During the release, interim/stabilization measures were implemented to limit exposure to human health and control impacts to the environment. Mitigation controls to protect human health included monitoring indoor air conditions in the surrounding residential homes and evacuating the residents that exhibit elevated carbon monoxide readings. In addition, an air monitoring program was implemented during the emergency response/clean-up field activities, and field personnel were properly trained for the conditions. Further, MSDS were available for all the materials that are managed at the plant in AK Steel's SPCC Plan. Mitigation controls to protect the environment included shutting off the coke oven gas and repairing the pipeline. Lastly, ten residential properties located west of the release location were purchased and demolished, and the coke oven gas pipeline was removed from service.

Based on Figures 15 (Site-wide Area), and 17 (Melt Plant Area), groundwater is simulated to be captured in the coke oven gas pipeline and immediate surroundings.

4.1.3 Coke Flushing Liquor Releases

There were five coke flushing liquor releases that were previously discussed in Section 2.6.3. All the releases were located in the general location of the stormwater sump (AOC 6). The coke flushing liquor release locations are presented on Figure 3 of Appendix E-1.

During each release, interim/stabilization measures were implemented to limit exposure to human health and control impacts to the environment. Mitigation controls to protect human health included monitoring atmospheric conditions, and utilizing emergency response/clean-up personnel that are trained for handling the type of material(s) that were released. Further, MSDS were available for all the materials that are managed at the plant in AK Steel's SPCC Plan. Mitigation controls to protect the environment included recovering free liquids (flushing liquor).

Based on Figures 15 (Site-wide Area), and 17 (Melt Plant Area), groundwater is simulated to be captured in the flushing liquor release locations.

4.1.4 Spent Pickle Liquor Releases

There were 11 spent pickle liquor releases that were previously discussed in Section 2.6.4. All the releases were located along the aboveground piping, and at injection well (HWMU 1 and 2) housing units. The spent pickle liquor release locations are presented on Figure 4 of Appendix E.

During each release, interim/stabilization measures were implemented to limit exposure to human health and control impacts to the environment. Mitigation controls to protect human health included emergency response training and procedures for emergency response/clean-up personnel. Further, MSDS were available for all the materials that are managed at the plant in AK Steel's SPCC Plan. Mitigation controls to protect the environment included recovering free liquids (spent pickle liquor), neutralization of soils by applying soda ash and lime, excavating the neutralized soil and disposing of the soil to a disposal facility. In addition, earthen dams were installed in the drainage ditches to prevent releases from entering Outfall 004.

Based on Figures 15 (Site-wide Area), and 18 (South Plant Area), groundwater is simulated to be captured in the spent pickle liquor release locations.

4.2 Groundwater Remediation Measures

The following sections present a summary of the groundwater remediation measures conducted by AK Steel.

4.2.1 Benzene in Groundwater Investigation

Benzene was first detected in the monitoring well GM-4S in 1989 during a quarterly groundwater sampling event (AOC 8). A two-phased groundwater investigation was conducted in 1991 and 1992 to delineate the extent of benzene in the upper aquifer (Geraghty & Miller, Inc. 1992). The coal tar storage tanks (AOC 2) were determined to be the most probable source of benzene in groundwater in the vicinity of GM-4S. Details of the site investigations are discussed in previous Section 3.1.1.4.

During the site investigations, interim/stabilization measures were implemented to limit exposure to human health and control impacts to the environment. Mitigation controls to protect human health included monitoring the air with an organic vapor meter, and donning the appropriate personal protective equipment during soil and groundwater sampling events. Mitigation controls to protect the environment included delineating the benzene in groundwater by installing soil borings and/or wells. In addition, natural attenuation of benzene was occurring in the upper aquifer, based on the results from the biogeochemical parameters. Groundwater samples are collected annually from the monitoring well network.

Based on Figures 15 (Site-wide Area), and 17 (Melt Plant Area), groundwater is simulated to be captured in the GM-4S area (AOC 8) and the suspected source area (AOC 2)

4.2.2 Coke Oven Gas Pipeline Release

As discussed in Section 3.1.1.5, the coke oven gas pipeline released coke oven gas into the subsurface and impacted the surrounding soil and shallow groundwater.

Interim/stabilization measures were implemented to limit exposure to human health and control impacts to the environment. Mitigation controls to protect human health included monitoring the air (breathing zone) with an organic vapor meter, and donning the appropriate personal protective equipment during sampling events and remediation applications. Mitigation controls to protect the environment included delineating the benzene in groundwater by installing soil borings and/or wells, operating the SVE system to remediate the soil, and applying aerobic oxidizer agent to impacted groundwater to remediate and enhance attenuation. Additional mitigation controls were implemented by AK Steel, which included the purchase and demolition of ten residential parcels to the west of the property line, and converting the area into a green belt. Furthermore, AK Steel removed the coke oven gas pipeline.

Based on Figures 15 (Site-wide Area), and 17 (Melt Plant Area), groundwater is simulated captured in the coke oven gas pipeline release and immediate surroundings.

4.3 Robin Hood Coal Pile RCRA Closure

The Robin Hood Coal Pile underwent RCRA closure, pursuant to Ohio EPA regulations (OAC 3745-55-10). Ohio EPA granted AK Steel a closure status on June 13, 2000. Details of the closure activities for the Robin Hood Coal Pile are presented in Section 3.1.1.6.

Interim/stabilization measures were implemented to limit exposure to human health and control impacts to the environment. Mitigation controls to protect human health included monitoring the air (breathing zone) with an organic vapor meter, and donning the appropriate personal protective equipment during sampling events and remediation applications. Mitigation controls to protect the environment included the over-excavation of impacted soils that may have the potential to leach to groundwater.

Based on Figures 15 (Site-wide Area), and 17 (Melt Plant Area), groundwater is not simulated to be captured in the former Robin Hood Coal Pile area.

4.4 Seep Remediation Measures

Groundwater seeps containing PCBs were present on the embankment of Monroe Ditch (east side in the Slag Processing Area that was previous discussed in Section 3.1.1.11).

Interim/stabilization measures were implemented to limit exposure to human health and control impacts to the environment. Mitigation controls to protect human health included donning the appropriate personal protective equipment, and understanding risks and hazards of PCBs and the surrounding areas. Mitigation controls to protect the environment included the installation of an interceptor trench (SWMU 45), where the groundwater seeps are captured and treated on-site. Routine O&M (sampling, carbon management) is implemented, and quarterly monitoring reports are submitted to the Ohio EPA. The Interceptor Trench and Treatment System (SWMU 45) are further discussed in upcoming Section 4.5.9.

Based on Figures 15 (Site-wide), and 18 (Slag Processing Area), groundwater is not simulated captured in the former seep remediation area.

4.5 Consent Decree Interim Measures

Twelve IMs are described in Attachment 1 of the Consent Decree. The areas included in these interim measures are shown in Figure 14. Areas investigated and/or remediated under the interim measures will not require separate investigation under the RFI, unless there is reason to believe that there has been a release from the facility after the interim measures are implemented. Each interim measure is summarized below.

4.5.1 Dicks Creek Floodplain Soil Sampling and Analysis (IM 1)

The objective of this field sampling effort was to characterize the condition of floodplain soil adjacent to Dicks Creek with respect to PCBs, and more specifically to delineate the horizontal and vertical extent of floodplain soils containing greater than 5 mg/kg PCBs. This information will be used, together with previously collected data, to direct floodplain soil excavation under IM 2. The floodplain areas subject to this interim measure are defined in Attachment 6 of the Consent Decree. Floodplain soil sampling was initiated during spring 2005 under the *Floodplain Soil Sampling and Analysis Plan* (ENVIRON 2005b). After identifying multiple hot spots during the initial investigation, a more intensive investigation was conducted in summer 2006, as detailed in the *Phase II Floodplain Soil Sampling and Analysis Plan* (ENVIRON 2006a). Further investigations provided additional data in fall 2007, as detailed in the *Floodplain Soil Supplemental Sampling Plan* (ENVIRON 2007a) and in spring 2009, as detailed in *Delineation of TSCA Areas 2 and 3, AK Steel Middletown Site, Middletown, Ohio* (ENVIRON 2009a). In addition to Reaches 1 and 2 of Dicks Creek (see IMs 6 and 7), IM 1 included floodplain sampling between Reach 1 and Slag Hauler Road; no PCB concentrations exceeding 5 mg/kg were detected in this area (ENVIRON, 2005c).

4.5.2 Dicks Creek Floodplain Soil Remediation (IM 2)

This interim measure entails the excavation and proper disposal of any Dicks Creek floodplain soils containing more than 5 mg/kg of PCBs, as demonstrated in the sampling and analyses conducted under IM 1. Using these results (ENVIRON 2005c, ENVIRON 2006b, ENVIRON 2008b, and ENVIRON 2009a), ENVIRON developed the *Dicks Creek Sediment and Reach 1 Floodplain Soil Remediation Design Document* (ENVIRON 2009b) describing in detail the methods that will be used to remove and dispose of contaminated soil in the upstream portion of Dicks Creek. Floodplain soil excavation will be conducted using standard construction equipment, and excavated areas will be restored with clean fill and native vegetation, as described in the Design Document. Remediation activities are scheduled to begin in June 2010. Likewise, ENVIRON will use the same dataset (ENVIRON 2005c, ENVIRON 2006b) to prepare a design document for Dicks Creek Reach 2 Sediment (and the rest of Reach 1) that will detail the methods that will be used to remove and dispose of contaminated soil in the downstream portion of Dicks Creek.

4.5.3 Residual Product Recovery at Well MDA-33S (IM 3)

The objective of IM 3 is the delineation, containment and recovery of free product in the vicinity of Monitoring Well MDA-33S. This monitoring well is located adjacent to Monroe Ditch, at the edge of SWMU 39 (Closed CERCLA Notification Solid Waste Landfill). The location, mobility, and chemical and physical properties of the free product in the vicinity of MDA-33S were determined through the investigation of the

Upland Sources Sampling and Analysis Plan (ENVIRON 2007b) from June through December 2007. Due to concerns of United States et al., a supplemental investigation was conducted in spring 2008. The data gathered from these investigations (ENVIRON 2008c) served as inputs to the engineering design to contain and treat the free product and other contaminants of concern. ENVIRON presented this design in the *MDA-33S and Monroe Ditch Remediation Design Document* (ENVIRON 2010). The proposed containment system will consist of a hydraulic barrier, a physical barrier, and a treatment system that will prevent the additional discharge of free product, PCBs, and other contaminants of concern to Monroe Ditch.

4.5.4 Soil Remediation at Locations SS-01, S23, and S25/28 (IM 4)

This interim measure includes the delineation, excavation, and disposal of contaminated soils containing more than 5 mg/kg PCBs in the areas of SS-01 (IM 4a), S23 (IM 4b), and S25/S28 (IM 4c), and the restoration of the excavated areas.

Historical soil sampling location SS-01 lies within former AOC 17 (Former Drainage Path from Former Oil Ponds). Soil sampling activities in the vicinity of SS-01 were conducted June through December 2007 under the *Upland Sources Sampling and Analysis Plan* (ENVIRON 2007b). Based on the results of this investigation (ENVIRON 2008c), ENVIRON developed the *Upland Sources Remediation Design Document* (ENVIRON 2008d), describing in detail the methods that were to be used to remove and dispose of contaminated soil. Remediation and restoration activities were completed in summer 2008, as documented in the *Upland Soil Remediation Completion Report* (ENVIRON 2008e). United States et al. acknowledged completion of these activities in November 2008.

Historical U.S.EPA sampling location S23 is located within the Dicks Creek floodplain. As such, the delineation activities for this area were conducted in conjunction with IM 1, and excavation and disposal activities will be conducted in conjunction with IM 2. Floodplain soil sampling was initiated during spring 2005 under the Floodplain Soil Sampling and Analysis Plan (ENVIRON 2005b). A more intensive investigation focused on these hot spots was conducted in summer 2006, as detailed in *Phase II Floodplain Soil Sampling and Analysis Plan* (ENVIRON 2006a). Using these results (ENVIRON 2005c, ENVIRON 2006b), ENVIRON will prepare a design document for Dicks Creek Reach 2 Sediment (and rest of Reach 1) that will detail the methods that will be used to remove and dispose of contaminated soil in the vicinity of S23.

Historical U.S.EPA sampling location S25/S28 are located within the Dicks Creek floodplain; location S25/S28 has also been designated as AOC 18/19. As such, the delineation activities for this area were conducted in conjunction with IM 1 and excavation and disposal activities will be conducted in conjunction with IM 2. Floodplain soil sampling was initiated during spring 2005 under the *Floodplain Soil Sampling and Analysis Plan* (ENVIRON 2005b). A more intensive investigation focused on these hot spots was conducted in summer 2006, as detailed in *Phase II Floodplain Soil Sampling and Analysis Plan* (ENVIRON 2006a). Using these results (ENVIRON 2005c, ENVIRON 2006b), ENVIRON developed the *Dicks Creek Sediment and Reach 1 Floodplain Soil Remediation Design Document* (ENVIRON 2009b) describing in detail the methods that will be used to remove and dispose of contaminated soil in the vicinity of S25/S28. Floodplain soil excavation will be conducted using standard construction equipment, and excavated areas will be restored with clean fill and native vegetation, as described in the Design Document. Remediation activities are scheduled to begin in June 2010.

4.5.5 Soil Remediation at Location BH-08 (IM 5)

This interim measure entailed delineation, excavation, and disposal of contaminated soils containing more than 25 mg/kg PCBs in the vicinity of AK Steel soil boring BH-08 and restoration of the excavated area. This historical soil boring is located at the northern edge of SWMU 40 (Closed Solid Waste Landfill on West Side of Slag Processing Area). Soil sampling activities were conducted in June 2007 under the *Upland Sources Sampling and Analysis Plan* (ENVIRON 2007b). Based on the results of this investigation (ENVIRON 2008c), ENVIRON developed the *Upland Sources Remediation Design Document* (ENVIRON 2008d), describing in detail the methods that were to be used to remove and dispose of contaminated soil. Remediation and restoration activities were completed in summer 2008, as documented in the *Upland Soil Remediation Completion Report* (ENVIRON 2008e). United States et al. acknowledged completion of these activities in November 2008.

4.5.6 Sediment Remediation in Monroe Ditch, the Outfall 002 Channel, and Reach 1 of Dicks Creek (IM 6)

This interim measure involves the delineation, excavation and proper disposal of sediment and other material from the portion of Monroe Ditch on AK Steel's property, the Outfall 002 channel, and Reach 1 of Dicks Creek. Reach 1 extends from approximately 50 feet upstream of Outfall 002 to approximately 400 feet downstream of Yankee Road. Remediation goals are to achieve total PCB concentrations not exceeding 1.5 mg/kg dry weight on a spatially weighted average basis, or 3.0 mg/kg dry weight in any individual sample. This will be achieved through the removal of all depositional sediment and any underlying clay exceeding the sediment remediation goals, to the extent practical, followed by backfill with clean material. The vertical and horizontal extent of depositional sediment, as well as the extent of PCB concentrations in the underlying clay or other native material, were delineated in accordance with the *Sediment Delineation Sampling and Analysis Plan* (ENVIRON, 2005d). Using these results (ENVIRON 2006c), ENVIRON developed the *Dicks Creek Sediment and Reach 1 Floodplain Soil Remediation Design Document* (ENVIRON 2009b), describing in detail the methods that will be used to remove and dispose of all depositional sediment and any underlying clay exceeding the sediment remediation goals in the upstream portion of Dicks Creek. Sediment excavation will be conducted using standard construction equipment, as described in the Design Document. Remediation activities are scheduled to begin in June 2010. Likewise, ENVIRON will use the same dataset (ENVIRON 2006c) to prepare a design document for Dicks Creek Reach 2 Sediment (and rest of Reach 1) that will detail the methods that will be used to remove all depositional sediment and any underlying clay exceeding the sediment remediation goals in the downstream portion of Dicks Creek.

4.5.7 Sediment Remediation in Reach 2 of Dicks Creek (IM 7)

Reach 2 of Dicks Creek extends from the downstream limit of Reach 1 to approximately 300 feet downstream of the Main Street Bridge. The remediation objectives and approach and delineation methods and documentation are as described above for IM 6. Implementation methods may differ, because this reach was never channelized and presents greater challenges for equipment access. ENVIRON will use the collected dataset to prepare a design document for Dicks Creek Reach 2 Sediment (and rest of Reach 1) that will detail the methods that will be used to remove all depositional sediment and any underlying clay exceeding the sediment remediation goals in the downstream portion of Dicks Creek.

4.5.8 Restoration of IM 6 Remediation Areas (IM 8)

As outlined in the *Dicks Creek Floodplain Soil and Sediment Remediation Design Document* (ENVIRON, 2009b) and *MDA-33S and Monroe Ditch Remediation Design Document* (ENVIRON, 2010), restoration measures will be implemented upon completion of (or concurrent with) IM 6. The Outfall 002 channel will be restored using rip-rap to return the channel to existing grade. Reach 1 of Dicks Creek will be restored through backfill with clean sand, gravel and cobble, as appropriate, to minimize channel incision and restore biological productivity to the maximum extent practical. The restoration of Monroe Ditch will be designed to limit movement of contaminants from the adjacent areas, minimize channel incision, and restore biological productivity to the extent practical. Monroe Ditch restoration will include the previously remediated AOC 10 (PCB Seep Area Near Bend in Monroe Ditch). The restoration effort is intended to enhance the existing riparian habitat and to provide, to the extent practicable, stable and diverse habitat necessary for establishment of a functional, diverse ecosystem. While it will not be possible to achieve truly “natural” conditions due to human impacts on the watershed (e.g., previous significant channelization, spatial constraints due to current land use), efforts will be made to restore the areas impacted by remedial activities to at least the ecosystem quality, diversity and functionality noted prior to remedial activities. Specific restoration methods are detailed within the *Dicks Creek Floodplain Soil and Sediment Remediation Design Document* (ENVIRON, 2009b).

4.5.9 Continued Operation of Groundwater Interceptor Trench (IM 9)

The groundwater interceptor trench and treatment system (SWMU 45) was installed between December 1997 and January 1998 to prevent PCB-containing groundwater seeps from entering Monroe Ditch. Under IM 9, a *Groundwater Interceptor Trench Operations and Maintenance (O&M) Plan* (ENVIRON, 2006d) was developed to formalize continued operation of the existing system. The O&M Plan provides for collection and analysis of samples of the system influent and effluent on a weekly basis, collection and analysis of samples of Monroe Ditch and Dicks Creek water on a monthly basis, and quarterly reporting to Ohio EPA. AK Steel will operate the existing interceptor trench and treatment system in accordance with the approved O&M Plan until no PCBs are detected in the influent for a period of at least 18 consecutive months.

4.5.10 Continued Groundwater Seep Inspection and Control (IM 10)

AK Steel has been conducting seep inspections since the fall of 2000. AK Steel will continue to inspect the banks of Dicks Creek adjacent to AK Steel property and the banks of Monroe Ditch for groundwater seeps every 2 weeks, weather conditions permitting, as described in the *Seep Inspection and Control O&M Plan* (ENVIRON, 2006e). If any new seep is detected, the new seep will be sampled as well as potentially impacted sediment or soil. All such samples will be analyzed for PCBs and pH. If any sample contains PCBs, or if it is outside the area covered by the phytoremediation barrier (IM 12) and exhibits a pH greater than 9.0, then AK Steel will provide a groundwater seep discharge-control workplan or a report evaluating whether the seep satisfies the criteria for Stabilization Activities under Paragraph 22 of the Consent Decree. AK Steel will implement the groundwater seep inspections until no high pH (i.e. pH>9) or PCBs are detected in any new seeps for a period of 18 months.

4.5.11 Maintenance of Signs and Fencing (IM 11)

Thirty-four public health advisory signs are posted along various locations throughout Dicks Creek and Monroe Ditch. These signs act as an institutional control intended to safeguard human health by warning visitors to abstain from swimming, bathing, drinking, or fishing within the waters. Until completion of IMs 2 through 8, AK Steel will inspect and repair existing signs and fencing on a monthly basis, as described in the *Signs and Fencing O&M Plan* (ENVIRON, 2006f). Also, AK Steel will ensure that the gate on AK Steel property adjacent to Outfall 002 remains locked, to restrict access to Dicks Creek.

4.5.12 Phytoremediation to Control Groundwater Seeps (IM 12)

AK Steel installed a phytoremediation barrier to control groundwater seeps emanating from the south bank of Dicks Creek. The previously remediated AOC 9 (PCB Seep Area East of Outfall 002 on South Side of Dicks Creek) is included within the phytoremediation area. The objectives of the phytobarrier as described in the *Phytoremediation Design Document* (ENVIRON, 2007c) are: (1) to decrease the quantity of groundwater seeping into Dicks Creek from the Tube City IMS Operations Area and (2) to reduce alkalinity (and related pH values) in any residual groundwater seepage within the phytoremediation zone. Through these mechanisms, the mature phytobarrier will serve as a preventive measure, creating conditions that control potential transport of PCBs into Dicks Creek via groundwater flow. In addition to reducing groundwater recharge and migration, the phytobarrier will enhance riparian habitat conditions, improve adjacent aquatic habitat conditions, and stabilize floodplain soils along the bank. The phytobarrier consists of native tree and shrub species, selected based on their tolerance of flooding and alkaline soil conditions. Soil amendments were introduced during planting, as needed, to lower the pH and increase fertility. Monitoring and maintenance are ongoing to verify survival and growth of the plantings. Phytoremediation activities were conducted in September through December 2007 (Shaw Environmental, 2008). Two annual monitoring events have been completed since installation.

5. Summary of SWMUs/HWMUs/AOCs/AAs

SWMUs/HWMUs/AOCs/AAs are areas that contained or may have contained solid or hazardous waste at the Middletown Works, either historically or presently. Those areas designated in the Consent Decree are described and evaluated in this section, Table 1, and Appendix A. Resource information used to generate the SWMU/HWMU/AOC/AA descriptions included the PR/VSI (PRC 1992), consultant's technical reports, file reviews conducted at the Middletown Works, and interviews with site employees. Locations of the SWMUs/HWMUs/AOCs/AAs are presented on Figures 1 and 2.

The SWMU/HWMU/AOC/AA summaries (Unit Data Sheets in Appendix A) were developed to provide a comprehensive, concise, consistent and accessible reference that presents relevant information obtained from the resources mentioned above. Each SWMU/HWMU/AOC/AA discussion includes a summary of information that includes the following:

- Description of the process that occurs or occurred at the unit, the approximate size of the unit, and major pieces of equipment associated with the unit;
- The general location of the unit within each plant area;
- The period of time in which the unit has been or was in operation;
- Information regarding waste management practices for the unit, including the process that generated the waste, if applicable, and the type of wastes expected to be located in the unit;
- Descriptions of any engineered features designed to control potential releases to the environment;
- Descriptions of historical releases that are documented and evidence of releases observed;
- A summary of any previous investigations that have been conducted at the unit;
- Data gaps, and

- A list of the sources used to obtain information regarding the unit.

Data sheets have been prepared for the 43 SWMUs, 2 HWMUs, 22 AOCs, and 9 AAs which contain a summary of this information. These data sheets are presented in Appendix A. For those units where previous investigations have been conducted, copies of pertinent information (i.e., historical analytical data, figures) are presented in Appendix E.

5.1 North Plant Area

Nine SWMUs were identified for the North Plant. The North Plant includes temper mills, coating lines, wastewater treatment plants, storage areas, and oil reclamation facilities. The temper mills and coating lines generate wastewaters and used oils. The wastewaters are treated (SWMU 1 North Terminal WWTP and SWMU 2 North Terminal WWTP Concentrator Pit) and discharged through an NPDES permitted Outfall 011. The used oils are reclaimed for reuse for other plant processes (SWMU 7 Former Used Oil Reclamation Facility [(Door 55A)], SWMU 8 Used Oil Reclamation Facility Number 2, and SWMU 9 Former Used Oil Reclamation Facility Number 3 [(Door 179A)]. The North Plant also contains storage of wastes generated by the former terne coating line (SWMU 3 Terne Coat Flux Hazardous Waste Storage Area, SWMU 4 Terne Coat Dross Bucket Storage Area, and SWMU 5 Terne Coat Satellite Accumulation Area) and storage of former PCB-contaminated materials (SWMU 6 PCB Storage Area [(Door 7)].

5.2 Melt Plant Area

Thirteen SWMUs and eight AOCs were identified at the Melt Plant Area. This area of the facility contains four of the manufacturing operations described in Section 2.5 (Coke Plant, Blast Furnace, Sinter Plant [prior to 2003], and BOF). Wastewaters generated from these operations are treated, clarified, and then discharged (NPDES permitted outfall or Middletown's POTW) or recycled within the facility (SWMU 11 Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds, SWMU 12 Blast Furnace/Sinter Plant Wastewater Treatment Facility, SWMU 13 BOF Wastewater Treatment Facility, SWMU 14 Coke Plant Wastewater Equalization Tank, and SWMU 18 Former Open Hearth WWTP). Formerly, coal tar decanter sludge was recycled at the Melt Plant (SWMU 15 Former Coal Tar Decanter Sludge Recycling Area and SWMU 16 Former Coal Tar Decanter Sludge Collection Bin). The Melt Plant contains several storage areas, tanks, and sumps (SWMU 10 Dorr Thickener and East Aboveground Tank, SWMU 19 Former Used Oil Storage Area, SWMU 20 Former

Benzol Tank Farm Area [(including Tar Tank Sludge Storage Area)], SWMU 21 Former Used Oil Accumulation Area [(by former Sinter Plant)], AOC 1 Coke Quenching Water Collection Plant, AOC 2 Tar Tanks, AOC 4 Former Rail Car Transfer Area, AOC 5 PCB Transformer Storage Building [(next to Former Open Hearth WWTP)], and AOC 6 Stormwater Sump and Release Areas). Two areas have been identified within the Melt Plant Area where releases of benzene and coke oven gas occurred and are being remediated (AOC 8 Benzene Release Area Possibly Related to AOC 2 Tar Tanks, AOC 20 AK/Armco property at Oxford State Road [(NS)] and Ottawa Street [(WS)], and SWMU 44 Coke Oven Gas Pipeline and Release Area). The north section of former north tar lagoon near the Robin Hood Pile (SMUW 17) was present prior to the operations of the Robin Hood Coal Pile. The former coal pile storage area within the Melt Area has undergone RCRA closure. A former dredge spoil fill area is located on the eastern side of the Melt Area (AOC 21 Dredge Spoil Fill Area – E/W diagonal fill area between the Melt Plant and South Plant [(2000 feet on both sides of Jackson Lane Ditch)].

5.3 Former Coil Paint Area (SWMU 23)

Operations at the former Coil Paint Area generated wastewaters associated with cleaning the steel prior to painting. The paint wastes, spent solvents, and contaminated paints were disposed of off-site as hazardous waste. The wastewaters generated at the former Coil Paint Area were treated at a WWTP and three lagoons (SWMU 23 Former Coil Paint Wastewater Treatment Lagoons). SWMU 23 was the only unit identified in the Consent Decree for the former Coil Paint Area. Currently, the Coil Paint Area is owned by Material Science Corporation and is no longer a part of the facility.

5.4 South Plant Area

Nine SWMUs, two HWMUs, and three AOCs were identified at the South Plant. The South Plant includes a hot mill, two pickle lines, cold mill, temper mill, hot dip aluminize line, electrogalvanizing line, and batch annealing operation. Also included are three WWTPs, one for the hot strip mill, one for the picklers and cold mill, and one for the electrogalvanizing line. The wastewaters are treated (SWMU 28 South Terminal WWTP and SWMU 32 Hot Slab [(or Mill)] WWTP), discharged to polishing ponds (SWMU 29 South Terminal Wastewater Treatment Polishing Ponds) and then discharged through an NPDES permitted outfall (Outfall 004). Formerly, a pond was used to contain plant upsets (SWMU 30 Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets). Spent pickle liquor generated from the pickling operation in the South Plant is stored (SWMU 33 Spent Pickle Liquor Tank Farm), filtered (SWMU 34 Spent Pickle Liquor Filtration System), and then injected into two deep permitted underground injection wells (HWMU 1 Easternmost Spent Pickle Liquor Injection Well (SWMU 35) and HWMU 2 Westernmost Spent Pickle Liquor Injection Well (SWMU 36)). These wells were originally identified as SWMUs 35 and 36 in the PR/VSI and then renamed HWMUs 1 and 2, respectively, in the Consent Decree. Used oils generated from operations at the South Plant are reclaimed for reuse for other plant processes (SWMU 31 South Terminal Used Oil Recovery Facility). Solid wastes generated at the facility, at one time, were temporarily stored (SWMU 37 Solid Waste Transfer Area) and managed for off-site disposal. Formerly, the South Plant contained a slag processing area that was located near the Melt Plant (SWMU 50 Former Slag Processing Area). There are also three dredge spoil fill areas within the South Plant (AOC 22 Dredge Spoil Fill Area near corner of Jackson Lane and Lefferson Road, AOC 23 Dredge Spoil Fill Area near corner of Oxford State Road and North Branch of Dicks Creek, and AOC 24 Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from North Branch of Dicks Creek to Jackson Lane Ditch [4,000 feet]).

5.5 Slag Processing Area

Eleven SWMUs and nine AOCs were identified in the Slag Processing Area. Formerly, the facility operated six solid waste landfills within the Slag Processing Area (SWMU 38 Closed Solid Waste Landfill by Yankee Road and Dicks Creek, SWMU 39 Closed CERCLA Notification Solid Waste Landfill [(includes former ponds west of Monroe Ditch)], SWMU 40 Closed Solid Waste Landfill on West Side of Slag Processing Area, SWMU 41 Closed Solid Waste Landfill West of Slag Processing Area Access Road, SWMU 42 Closed Solid Waste Landfill East of Slag Processing Area Access Road, and SWMU 43 Closed Solid Waste Landfill). Wastes placed in SWMU 38 included construction debris and residual wastes from steel-making operations (operational wastes included BOF air pollution control dust, scrubber sludges, and wastewater treatment sludges from the blast furnace, sinter plant, BOF, hot strip mill, north and south terminal treatment plants, and water softening plants). Wasted placed in SWMU 39 included tar decanter sludge (K087), open hearth wastewater sludges, oily solid wastes, air pollution control dust scrubber sludges, wastewater treatment plant sludges, and some landfill cells contained only tar waste. Wastes placed in SWMU 40 included slag, soils from new facility construction excavations, rubble, trash, blast furnace dust and may contain various plant wastewater treatment sludges. Wastes placed in SWMU 41 included wastewater treatment sludges from the BOF, Blast Furnace, South Terminal, and Hot Strip Mill wastewater treatment plants, and dust from the blast furnace, BOF, and Hot Strip Mill. Wastes placed in SWMU 42 included wastewater treatment sludges from the BOF, South Terminal, and Hot Strip Mill wastewater treatment plants and dust from the blast furnace, BOF, and Hot Strip Mill. Wastes placed in SWMU 43 included sludges from the wastewater treatment plants and dust from the air pollutions controls. These landfills are closed and have vegetated soil covers.

SWMUs and AOCs associated with the Slag Processing Area include: SWMU 46 Current Oil Storage Area, SWMU 47 Former Oil Separator Ponds and vicinity, SWMU 48 Existing Fueling Area in SW part of Slag Processing Area, SWMU 49 Former Kish Quenching Area, AOC 11 Mill Scale Area 1, AOC 12 Mill Scale Area 2, AOC 13 Mill Scale Area 3, AOC 14 Raw Slag Area, AOC 15 Finished Slag Area, and AOC 16 7 Oil Transformer Locations ("T" in Slag Processing Area). Several SWMUs and AOCs are associated with landfill seeps, drainage from former oil ponds, and treatment of slag quenching water (AOC 9 PCB Seep Area East of Outfall 002 on South side of Dicks Creek, AOC 10 PCB Seep Area Near Bend in Monroe Ditch, AOC 17 Former Drainage Path from Former Oil Ponds [(SWMU 47)], and SWMU 45 Interceptor Trench and Treatment System).

5.6 Additional Areas of Potential Concern

Two AOCs and nine AAs were identified that include off-site properties located west of the Slag Processing Area, along Oxford State Road and Yankee Road. Dredged sediments were placed on these properties from the channelization of Dicks Creek conducted by the Miami Conservancy District in the late 1960s. These properties include: AOC 18 Flood Plain Area West of Railroad Bridge in Vicinity of U.S.EPA Samples S25/S28, AOC 19 Flood Plain Area in front of Former Orman's Welding, AA 01 Flood Plain Area west of Yankee Road in Vicinity of U.S.EPA Sample S23, AA 02 Former Glenn Cartage property (NS of DC, East of Yankee Road), AA 03 Sturgell Property (NS of DC, West of RR Bridge, East of Yankee Road), AA 04 Back Half of Properties between Glenn Cartage and Sturgell Properties (NS of DC), AA 05 Old Armco Lot NS DC, North of Big Meander, AA 06 Former Burridge Machine Shop Property, NS DC (now a dairy outlet), AA 07 Former Cecil Osburn Lot (located between Station 12-18, NS of DC), AA 08 Pipeline Fill, Stations 32-36, along Oxford State Road, north of Outfall 002, and AA 09 Former Orman's Welding Property.

6. Screening and Release Assessment of SWMUs/HWMUs/AOCs/AAs

An objective of the CCR is to eliminate units from further investigation based on an evaluation and screening of existing data and an assessment of a unit's release potential. The screening process to be followed for each unit is presented in Section 6.1. The outcome of the screening process is discussed by plant area in this section and is summarized in Table 1.

6.1 Technical Approach for Screening and Release Assessment

The determination of whether a SWMU/HWMU/AOC/AA requires further investigation is based on three considerations:

1. Whether hazardous constituents were managed at the unit,

2. Whether sufficient evidence of a release of hazardous constituents exists, and

3. Whether potentially significant levels of released hazardous constituents exist in the environment.

A 'yes' under all three considerations would support a determination that a SWMU/HWMU/AOC/AA constitutes a potentially significant source and further investigation would be warranted. Another consideration is whether sufficient documentation is available to evaluate if a release has occurred. Further action may be warranted if insufficient documentation is available.

As stated in Part 1 of Attachment 2: RFI/CMS SOW, AK Steel may propose to eliminate any area from further investigation based on the data screening (comparison of existing data to the RSLs). The results of this comparison were presented in Section 3.1.3. Each unit that is proposed to be eliminated from further evaluation has been identified in this section and on Table 1.

The following sections and Table 1 present information to support this evaluation process. This includes a release assessment based on information presented on the data sheets in Appendix A. Additionally, previous investigations of SWMUs and AOCs were relied upon for the screening decision-making process based on whether data from a previous investigation adequately characterized contaminant levels at a unit. A summary of these investigations were presented in Section 3.1.1., where appropriate, data gaps were identified for the units and are discussed in this section, in Appendix A, and on Table 1.

Another screening tool used to evaluate whether a unit should be eliminated, is the Refinement of the Groundwater Flow Model (ARCADIS, Inc. 2009). Results from the 2009 calibration simulation suggest that the current on-site extraction well system successfully contains a significant portion of shallow and deep groundwater flow in the aquifer system in the vicinity of the site. Figure 15 presents the simulated capture area in the model Layer 1 (shallow groundwater) and unit locations. Part of the unit screening evaluation will be an assessment of whether the unit is located in an area of simulated capture.

6.2 North Plant Area

Based on Figures 15 and 16, in the North Plant Area, groundwater is captured for all SWMUs located in this area.

SWMU 1 North Terminal WWTP – This active WWTP receives and treats wastewater from the North Plant Area, including a concentrator pit (SWMU 2), Air Products Facility, and #3 Zinc Grip. The sludge generated by the WWTP is characterized as nonhazardous for metals. There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place and wastes are stored in containers on paved surfaces. These controls would likely prevent a release from reaching soil, and groundwater is captured based on Figures 15 and 16. SWMU 1 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 2 North Terminal WWTP Concentrator Pit – This active concentrator pit receives wastewater from the North Plant and other sources. There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place and the wastewaters are stored in a reinforced concrete basin. The release potential into the environment, due to the unknown integrity of the concrete basin is considered a data gap; however, groundwater is captured based on Figures 15 and 16. SWMU 2 is retained for further evaluation in the RFI.

SWMU 3 Terne Coat Flux Hazardous Waste Storage Area – This inactive storage area contained flux skimmings stored in drums. Flux skimmings contain lead and cadmium. While minor releases have occurred, they were contained by a concrete floor and cleaned up. Some spillage and floor staining was noted in 1991 during the PR/VSI. The potential for a release to occur was very low because this unit had engineered controls in place and wastes were stored in containers on a paved surface inside a building. The release potential into the environment, due to the unknown integrity of the concrete floor is considered a data gap; however, groundwater is captured based on Figures 15 and 16. SWMU 3 is retained for further evaluation in the RFI.

SWMU 4 Terne Coat Dross Bucket Storage Area – This inactive storage area formerly contained dross buckets. Dross contains lead. While documented releases did not occur, some spillage was noted in 1991 during the PR/VSI site visit. The potential for a release to occur was very low because this unit had engineered controls in place and wastes were stored in containers on a paved surface inside a building, and the properties of dross is a solid material. The release potential into the environment, due to the unknown integrity of the concrete floor is considered a data gap; however, groundwater is captured based on Figures 15 and 16. SWMU 4 is retained for further evaluation in the RFI.

SWMU 5 Terne Coat Satellite Accumulation Area – This inactive accumulation area formerly contained terne flux skimmings stored in a drum. Flux skimmings contain lead. There were no documented releases. The potential for a release to occur was very low because this unit had engineered controls in place and terne flux skimmings were stored in a drum on a paved surface inside a building. These controls would have likely prevented a release from reaching soil, and groundwater is captured based on Figures 15 and 16. SWMU 5 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 6 PCB Storage Area (Door 7) – This area has not been used since approximately 2000 when AK Steel disposed of all of its PCB contaminated equipment. There were no documented releases. The potential for a release to occur was very low because this unit had engineered controls in place and equipment was stored on a concrete surface, enclosed by a chain link fence, inside a building. The release potential into the environment, due to the management of PCB materials and presence of a sump in the storage area is considered a data gap; however, groundwater is captured based on Figures 15 and 16. SWMU 6 is retained for further evaluation in the RFI.

SWMU 7 Former Used Oil Reclamation Facility (Door 55A) – This inactive unit formerly consisted of a below-grade concrete collection pit, three oil/water separation tanks, reclaimed oil storage tanks, pumps and piping, and accepted used oil from Temper

Mills. Most of the tanks and ancillary equipment (except reclaimed oil storage) were located inside a building. The oil was recycled and reused at the plant. There were no documented releases. The potential for a release to occur was very low because this unit had engineered controls in place, including secondary containment. The release potential into the environment, due to the management of used oils in this area is considered a data gap; however, groundwater is captured based on Figures 15 and 16. SWMU 7 is retained for further evaluation in the RFI.

<u>SWMU 8 Used Oil Reclamation Facility Number 2</u> – This active unit consists of three oil/water separator tanks, an oil skimmer pit and an aboveground outdoor tank. Most of the tanks and ancillary equipment (except reclaimed oil storage) are located inside a building. Used oils and oily wastewaters are accepted at this unit and temporarily stored until they are transferred to the South Terminal Used Oil Reclamation Facility (SWMU 31) for further processing. There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place, including paved surfaces and secondary containment. The release potential into the environment, due to the management of used oils in this area is considered a data gap; however, groundwater is captured based on Figures 15 and 16. SWMU 8 is retained for further evaluation in the RFI.

<u>SWMU 9 Former Used Oil Reclamation Facility Number 3 (Door 179A)</u> – This inactive unit formerly consisted of a below-grade concrete collection pit, three oil/water separation tanks, and an aboveground storage tank. The oil was recycled and reused at the plant and there were no documented releases. The potential for a release to occur was very low because this unit had engineered controls in place, including impervious surfaces and secondary containment. The release potential into the environment, due to the management of used oils in this area is considered a data gap; however, groundwater is captured based on Figures 15 and 16. SWMU 9 is retained for further evaluation in the RFI.

6.3 Melt Plant Area

Based on Figures 15 and 17, in the Melt Plant Area, groundwater is captured for all SWMUs and AOCs located in this area with the possible exceptions of SWMU 17, SMWU 20, AOC 4 and AOC 20.

<u>SWMU 10 Dorr Thickener and Aboveground Tank</u> – This active unit consists of a 25-foot high concrete structure which receives gas scrubbing wastewater from the blast furnace scrubber and an overflow tank. There are no documented releases. The

potential for a release to occur is low because this unit has engineered controls in place, including paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 17. SWMU 10 is not a potentially significant source of contamination and is not retained for further evaluation.

<u>SWMU 11 Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds</u> – This active unit contains two unlined ponds used to manage wastewater from the Melt Plant operations. The ponds were installed in 1952 and are currently in operation, with the Sinter Plant being in operation between 1972 and 2003. EP toxicity testing in 1980 and TCLP analysis in 1990 determined that the sludge deposited in the ponds was non-hazardous. There are no documented releases. The potential for a release to soil and groundwater is moderate because the lagoons were unlined; however, groundwater is captured based on Figures 15 and 17. A release assessment has not been completed and is considered a data gap. SWMU 11 is retained for further evaluation in the RFI.

<u>SWMU 12 Blast Furnace/Sinter Plant Wastewater Treatment Facility</u> – This active wastewater treatment facility consists of three clarifiers that receive wastewater from the Blast Furnace/Sinter Plant Wastewater Treatment Plant Sludge Ponds (SWMU 11). This facility began operating in 1970. There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place and wastewaters are stored in tanks on paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 17. SWMU 12 is not a potentially significant source of contamination and is not retained for further action evaluation.

<u>SWMU 13 BOF Wastewater Treatment Facility</u> – This active wastewater treatment facility consists of a hydroclone, two clarifiers, vacuum filters and sludge transfer station that receive wastewater from the BOF scrubbing activities. This facility was constructed in 1969 and is still operating. There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place and wastes are managed in containers on paved surfaces. At this time, some clarifier fines are stored temporarily on the ground. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 17. SWMU 13 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 14 Coke Plant Wastewater Equalization Tank – This active unit consists of a one million gallon above ground steel tank used to store wastewater containing ammonia from the Coke Plant. The tank system includes a reinforced concrete pad, beneath the tank and flow controls are used to regulate discharge flow that is equipped with a siphon breaker. The wastewater from this tank is discharged to the City of Middletown Wastewater Treatment Plant for further treatment. There are no documented releases into the environment. The potential for a release to occur is very low because this unit has engineered controls in place, including reinforced concrete surfaces and secondary containment installed since the PR/VSI was conducted in 1992. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 17. SWMU 14 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 15 Former Coal Tar Decanter Sludge Recycling Area – This inactive sludge recycling area was operated by AKJ Industries, Inc. and formerly managed tar decanter sludge generated from coking operations during the period from 1990 through 1995. The equipment has been decommissioned and only the concrete pad and berms remain. Documented releases include some staining associated with steam pipes condensate and coal tar spillage noted inside and outside the berm during the 1991 PR/VSI visit. There are documented releases and a release assessment has not been completed, this is considered a data gap; however, groundwater is captured based on Figures 15 and 17. SWMU 15 is retained for further evaluation in the RFI.

SWMU 16 Former Coal Tar Decanter Sludge Collection Bins – This inactive unit contained collection bins used to handle coal tar decanter sludge from the coking operations. The equipment has been decommissioned and only the concrete pad remains. There are no documented releases from this unit; however, an Ohio EPA investigation in 1990 identified K087 waste in soil prior to installation of the secondary containment and in 1992 identified the presence of benzene in waste on the concrete pad. This unit had engineered controls installed in the early 1990s, with the bins being stored on bare ground prior to this time. There is potential for release of TDS into the environment and a release assessment has not been completed and is considered a data gap; however, groundwater is captured based on Figures 15 and 17. SWMU 16 is retained for further evaluation in the RFI.

SWMU 17 North Section of Former Northern Tar Lagoon (Near Robin Hood Coal Pile)
Prior to the Robin Hood Coal storage area, the foot print of the tar lagoons were present beneath much of the eastern end of the coal pile. The operations of the tar lagoons were observed in the aerial photographs between March 1956 and June 1966.

To address the residual tar from the former tar ponds, approximately 6,360 cubic yards of impacted soil was excavated and transported for off-site disposal as part of RCRA closure for the Robin Hood Coal Pile. The excavation encompassed both former tar ponds, except the north section (approximately 3,843 square feet) of the former northeast pond, due to access restrictions because this section was beneath a plant access road. The mixing of coal tar decanter sludge (K087) at the Robin Hood Coal Pile operated from 1983 to 1990. In 2000, the Robin Hood Coal Pile achieved closure certification and the area is currently not in use. The Robin Hood Coal Pile portion of SWMU 17 does not require further evaluation but the north section of the former tar pond will be retained. The release potential into the environment has not been assessed and is considered a data gap; groundwater is not captured based on Figures 15 and 17. SWMU 17 in the north section of the former northern tar lagoon is retained for further evaluation in the RFI.

<u>SWMU 18 Former Open Hearth WWTP</u> – This former wastewater treatment facility consisted of clarifiers and vacuum filters that received wastewater from a gas cleaning scrubber system from the Open Hearth Furnace and water from the BOF. This facility began operating in 1970 and was demolished in 1993. There are no documented releases. The potential for a release to occur was low as this unit likely had engineered controls in place and wastes would have been stored in containers on paved surfaces. In addition, groundwater is captured based on Figures 15 and 17. SWMU 18 is not a potentially significant source of contamination and is not retained for further evaluation.

<u>SWMU 19 Former Used Oil Storage Area</u> – According to the PR/VSI this area was constructed of concrete with no secondary containment. The PR/VSI also stated that used oil from various plant processes was transported to the Used-Oil Storage Area where it was mixed with fuel oil and stored in 55-gallon drums until reused in the plant. During the CCR site visit an AK Steel representative indicated that this unit was inaccurately described during the PR/VSI as an oil storage area because the area was not routinely used for that purpose, but rather was an area designated for the mason's cleaning of refractory equipment. There are no documented releases in this area and groundwater is captured based on Figures 15 and 17. SWMU 19 is not a potentially significant source of contamination and is not retained for further evaluation.

<u>SWMU 20 Former Benzol Tank Farm Area (including Tar Tank Sludge Storage Area)</u> – This unit was part of a by-product recovery facility associated with the Coke Plant. In addition to a tank farm the facility contained various distillation columns, heat exchangers, and piping. The facility was used to recover benzene and various

products created as a by-product from coking-operation. The tank farm consisted of a series of above-ground storage tanks containing recovered fuels. This unit was first used in the 1950s and the system was shut down in 1984. There have been no documented releases. Engineered controls in the form of secondary containment were in place. The release potential into the environment has not been assessed and the management of coke by-products in this area is considered a data gap. Groundwater is not captured based on Figures 15 and 17. SWMU 20 is retained for further evaluation in the RFI.

<u>SWMU 21 Former Used Oil Accumulation Area (by Sinter Plant)</u> – This area was used as a staging area for drums containing used oil. These drums were staged on a concrete pad prior to recycling. The period of operation is unknown, though drum storage was likely coincident with operation of the Sinter Plant from 1972 to 2003. There are no documented releases related to the Former Used Oil Accumulation Area, though during the PR/VSI oil-stained soil was observed near the drums. In addition, groundwater is captured based on Figures 15 and 17. SWMU 21 is not a potentially significant source of contamination and is not retained for further evaluation.

<u>SWMU 44 Coke Oven Gas Pipeline and Release Area</u> – On January 24, 1996 Coke Oven Gas Pipeline release was reported. From April 1996 through March 1998, corrective actions were implemented by installing a SVE system to remediate the shallow impacted soils. The groundwater was remediated by injecting an oxidizer solution to enhanced attenuation. AK Steel purchased ten residential parcels to the west of the property line, demolished them and converted the area into a green belt. In addition, the COG pipeline was permanently removed, and the most recent (August 2007) laboratory analytical results in groundwater indicated that benzene concentrations were below laboratory detection levels from the monitoring well network. Furthermore, groundwater is captured based on Figures 15 and 17. SWMU 44 has been adequately characterized during previous investigations and is not retained for further evaluation.

<u>AOC 1 Coke Quenching Water Collection Plant</u> – This unit consists of a rectangular shaped basin that collects water used to cool hot coke removed from the coking ovens. The water collected is recycled back to the adjacent quenching tower. During the PR/VSI visit it was noted that it was possible for coke particles to settle out of the water and accumulate in the basin. No hazardous constituents have been identified in this unit and there are no documented releases. The release potential into the environment, due to the unknown integrity of the concrete basin is considered a data

gap; however, groundwater is captured based on Figures 15 and 17. AOC 1 is retained for further evaluation in the RFI.

AOC 2 Tar Tanks – The former Tar Tanks consisted of two steel above-ground tanks located at the southern section of the Melt Area. The tanks were installed in the early 1950s and consisted of a riveted 635,000-gallon capacity tank (west tank) and a larger welded 700,000-gallon capacity tank (east tank). The western and eastern tar tanks were decommissioned in 1994 and 2008, respectively. Currently, the tar is stored in a 394,000 gallon aboveground storage tank with secondary containment that was placed into service in April 2000. The tar tank facility stores coal tar pumped over from the batteries to allow settling time prior to shipment to off-site customers. Until 1993 the Tar Tanks were located on a slag and sand bed surrounded by an earthen berm constructed in the 1960s. After the classification of coal tar bottoms by the EPA in July 1992, AK Steel built a secondary containment system. In 1993 each tank was modified with a new false bottom welded circumferentially to the side walls above an eight inch layer of sand. Leak detection valves were installed in the annulus to detect future tank floor leakage. Outside the tanks a 30-foot high steel ring wall was installed with a steel bottom welded to the base of each tank to provide additional secondary containment. In addition a new concrete area common to both tanks was installed to prevent ground contact of materials during future tank cleanouts. Prior to the installation of the secondary containment measures wastes related to the cleanout of the Tar Tanks were placed directly on the ground adjacent to the tanks. During an Ohio EPA site visit in 1990, 13,000 gallons of cleanout waste was observed on the ground within the earthen bermed area. A total of three documented tar spills at the tanks or tar loading station occurred in 1992 (500 gallons) and 1994 (30 and 100 gallons). The release potential into the environment has not been assessed, due to the management of coke by-products in the former tar tanks is considered a data gap; however, groundwater is captured based on Figures 15 and 17. AOC 2 is retained for further evaluation in the RFI.

AOC 4 Former Rail Car Transfer Area – This former unit rail car loading area consisted of three bays with piping used to dispense by-products to railcars from the plant. During production a drip pad was used to contain spills. This facility was first used in the 1950s and the area was decommissioned before February 1992. There are no documented releases from this AOC but the potential for a release was high. The release potential into the environment has not been assessed, due to the former management of coke by-products is considered a data gap. Groundwater is not captured based on Figures 15 and 17. AOC 4 is retained for further evaluation in the RFI.

AOC 5 PCB Transformer Storage Building (next to Former Open Hearth WWTP) – This unit consists of a corrugated metal building which currently houses non-PCB containing transformers and associated equipment. The operations in the building began in 1970, use as a PCB-storage area began after that time. By approximately 2000, AK Steel disposed of all of its PCB contaminated equipment. There are no documented releases and the potential for a release is low. The building has a concrete floor and is secured and groundwater is captured based on Figures 15 and 17. AOC 5 is not a potentially significant source of contamination and is not retained for further evaluation.

AOC 6 Stormwater Sump and Release Areas – The stormwater sump is a below-grade concrete pit collects stormwater from the surrounding curbed area including runoff from the Former Coal Tar Decanter Sludge Collection Bins (SWMU 16) and condensation from the coke oven gas line. There are no documented releases associated with the collection sump and the potential for a release is moderate. During the PR/VSI, green-colored liquid was observed next to the sump. AK Steel attributed this to algal blooms and, therefore, it was assumed that this liquid was ammonia-containing, which may indicate local releases of nitrogen-rich fluids such as flushing liquor. The collection sump is constructed of concrete. In addition, there were five major flushing liquor releases reported in this general area (Refer to Section 2.6.3). The release potential into the environment has not been assessed, due to the management of coke by-products is considered a data gap; however, groundwater is captured based on Figures 15 and 17. AOC 6 is retained for further evaluation in the RFI.

AOC 8 Benzene Release Area Possibly Related to AOC 2 Tar Tanks – This area is defined by monitoring well GM-4S and is located approximately 200 yards southwest of the Tar Tanks (AOC 2). Currently the Area is a fenced-in portion of the southern Melt Area. The Benzene Release Area has been characterized by the increased concentrations of benzene in monitoring well GM-4S which was installed in 1989. The extent of the plume was delineated during several phases of investigation, and the concentration of benzene has continued to attenuate naturally over time. A Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment (ERA) have been conducted for the Dicks Creek Area, including the benzene release area and concluded that there are no unacceptable risks to human health or the environment at the Dicks Creek Area. Furthermore, groundwater is captured based on Figures 15 and 17. AOC 8 has been adequately characterized during previous investigations and is not retained for further evaluation.

AOC 20 AK/Armco property at Oxford State Road and Ottawa Street – This area is a rectangular parcel of land located on the south side of Oxford State Road purchased to allow access for further delineation of the benzene plume (AOC 8) associated with the Tar Tanks (AOC 2) to the north. Currently the property is surrounded by a chain-link fence and is vacant. Benzene concentrations in monitor wells on this property have decreased over time and the last detectable concentrations on this property was at GM-54S (10 ug/L) during the March 1999 site-wide monitoring event, with no detectable concentration of benzene present in subsequent annual sampling events up through 2005. There have been no documented releases associated with this property. Groundwater is not captured based Figures 15 and 17. AOC 20 is not a potentially significant source of contamination and is not retained for further evaluation.

AOC 21 Dredge Spoil Fill Area – E/W diagonal fill area between Melt Area and South Plant (2000 feet on both sides of Jackson Lane Ditch) – This area is located in the southeast corner of the Melt Area. The original plan for the area included two fill areas separated by what is now a road. Area 1 was approximately 225 feet by 725 feet. Area 2 was south and east of Area 1 and extended approximately 950 feet by 325 feet. A total surface area of approximately 1,300 square feet was designated as the Dredge Spoil Fill Area. This dredge spoil fill area was to accept the soil removed during channelization activities in Dicks Creek, and there are no documented releases in this area. The release potential into the environment has not been assessed, due to the management of suspected PCB impacted sediments/soils from Dicks Creek channelization is considered a data gap; however, groundwater is captured based on Figures 15 and 17. AOC 21 will be retained for further evaluation in the RFI.

6.4 Former Coil Paint Area (SWMU 23)

SWMU 23 Former Coil Paint Wastewater Treatment Lagoons – This unit contained three unlined wastewater lagoons associated with the Coil Paint operations. The wastewaters contained metals. The lagoons were in operation from 1971 to 1978. In the mid-1980s, the lagoons were backfilled and capped with a vegetated soil cover. There were no documented releases. The potential for a release to soil to occur is moderate because the lagoons were unlined. With current groundwater flow to the northeast, existing monitoring wells that are upgradient (GM-1S, GM-1D) and cross gradient (GM-2S) do not currently contain detectable levels of VOCs. Based on Figure 15 for SWMU 23, groundwater is captured in this area. The release potential into the environment has not been assessed, due to the unlined lagoons is considered a data gap; therefore, SWMU 23 is retained for further evaluation in the RFI.

6.5 South Plant Area

Based on Figures 15 and 18 in the South Plant Area, groundwater is captured for all SWMUs, HWMUs, and AOCs located in this area.

SWMU 28 South Terminal WWTP – This active WWTP receives and treats wastewater from the cold mill operations, two pickle rinse wastewater streams, and the Electrogalvanizing Line rinse water from holding tanks. The sludge generated by the WWTP is characterized as nonhazardous for metals. There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place, is continuously monitored by instrumentation and plant personnel, and wastes are stored in containers on paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 18. SWMU 28 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 29 South Terminal Wastewater Treatment Polishing Ponds – This active unit receives treated water from SWMU 28 for further polishing. The ponds are clay lined. Approximately every 10 years, the ponds are pumped for removal of sediment/sludge and the material is disposed off-site. There are no document releases. The potential for a release to occur is very low because this unit receives treated wastewater and the ponds are periodically pumped. These controls would likely prevent a release from reaching soil or surface water and groundwater is captured based on Figures 15 and 18. SWMU 29 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 30 Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets – This former unit was designed to contain upsets from SWMU 28. The pond was not lined. There are no document releases and no upsets from SWMU 28 occurred. The pond was used to temporarily store staging material from SWMU 28 operations and material pumped from SWMU 29 prior to being disposed. The potential for a release to occur is very low because this unit temporarily stored the staging material and a release to soil or surface water was not documented during the period of time the storage occurred. In addition, groundwater is captured based on Figures 15 and 18. SWMU 30 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 31 South Terminal Used Oil Recovery Facility – This active unit consists of three oil/water separator tanks, an aboveground outdoor tank, and three horizontal tanks for oil reclamation. The oil is recycled and reused at the plant as fuel. There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place, including paved surfaces and secondary containment. These controls would likely prevent a release from reaching soil. The release potential into the environment has not been assessed, due to the management of used oils in the area is considered a data gap; however, groundwater is captured based on Figures 15 and 18. SWMU 31 is retained for further evaluation in the RFI.

SWMU 32 Hot Slab (or Mill) WWTP – This active WWTP (referred to as the Hot Strip Mill) receives and treats wastewater from the hot strip mill operations. The WWTP consists of three rapid mix tanks, six clarifiers, and four vacuum filters. The sludge generated by the WWTP is characterized as nonhazardous. There are no documented releases, other than a one-time release of microbiocide in July 1992. As a result of that release, microbiocide is no longer used. The potential for a release to occur is very low because this unit has engineered controls in place, is continuously monitored by instrumentation and plant personnel, and wastes are stored in containers on paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 18. SWMU 32 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 33 Spent Pickle Liquor Tank Farm – This active unit consists of three aboveground storage tanks that contain spent pickle liquor. Spent pickle liquor (K062) primarily contains hydrogen chloride and ferrous chloride. While SPL releases have occurred, the spills were contained, recovered, and soils were removed for off-site disposal after applying neutralization agents. The pipeline has been upgraded to minimize leaks and spills. There are no documented releases from the storage tanks. The SPL injection operations are inspected semi-annually by Ohio EPA representative, and compliance monitoring is conducted semi-annually. The compliance monitoring includes collecting groundwater samples from the lowermost (USDW-01), and submitting a report to Ohio EPA using intrawell statistical methodologies. Furthermore, the SPL line from the pickler building to the injection wells was upgraded to double wall piping in 1998. The potential for a release to occur is very low because this unit has the previously described engineered controls in place and secondary containment for the storage tanks. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 18. SWMU 33 is not a potentially significant source of contamination and is not retained for further evaluation.

SWMU 34 Spent Pickle Liquor Filtration System – This active unit includes a filtration system for the removal of solids from spent pickle liquor prior to deep well injection

(HWMUs 1 and 2). There are no documented releases, and the potential for a release to occur is very low because this unit has engineered controls in place. Additionally, the filtration system is located in an enclosed building and is periodically checked by plant personnel. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 18. SWMU 34 is not a potentially significant source of contamination and is not retained for further evaluation.

<u>HWMU 1 Easternmost Spent Pickle Liquor Injection Well (SWMU 35)</u> – HWMU is the eastern SPL injection well #2 (formerly SWMU 35 in the PR/VSI report) is a Class I hazardous injection well, regulated by the Ohio EPA's UIC program, under permit number UIC 05-09-002-PTO-I. On January 26, 1998, approximately 150 gallons of SPL was released on the ground near the injection well building. The SPL release was immediately contained in a drainage ditch, where free liquids were removed by a vacuum truck, and the impacted soils were treated by mixing lime and soda ash (neutralization). After neutralization, the soils were removed for off-site disposal.

The SPL injection operations are inspected semi-annually by Ohio EPA representative, and compliance monitoring is conducted is semi-annually. The compliance monitoring includes collecting groundwater samples from the lowermost (USDW-01), and submitting a report to Ohio EPA using intrawell statistical methodologies. Furthermore, the SPL line from the pickler building to the injection wells was upgraded to double wall piping in 1988.

The potential for a release into the environment to occur is very low because this unit has engineered controls and compliance monitoring programs in place In addition, SPL operations is located in the part of the South Plant Area, where plant pumping influences the hydraulic control of the upper aquifer. Therefore, groundwater is captured based on Figure 15 and 18. HWMU 1 is not a potentially significant source of contamination and is not retained for further evaluation.

<u>HWMU 2 Westernmost Spent Pickle Liquor Injection Well (SWMU 36)</u> – HWMU is the western SPL injection well #1 (formerly SWMU 35 in the PR/VSI report) is a Class I hazardous injection well, regulated by the Ohio EPA's UIC program, under permit number UIC 05-09-002-PTO-I. On February 16, 1993 and March 3, 1998, approximately 3,800 and 200 gallons of SPL was released on the ground near the Injection Well #1, respectively. During each release, the SPL release was immediately contained in a drainage ditch, where free liquids were removed by a vacuum truck, and the impacted soils were treated by mixing lime and soda ash (neutralization). After neutralization, the soils were removed for off-site disposal.

The SPL injection operations are inspected semi-annually by Ohio EPA representative, and compliance monitoring is conducted is semi-annually. The compliance monitoring includes collecting groundwater samples from the lowermost (USDW-01), and submitting a report to Ohio EPA using intrawell statistical methodologies. Furthermore, the SPL line from the pickler building to the injection wells was upgraded to double wall piping in 1988.

The potential for a release into the environment to occur is very low because this unit has engineered controls and compliance monitoring programs in place In addition, SPL operations is located in the part of the South Plant Area, where plant pumping influences the hydraulic control of the upper aquifer unit. Therefore, groundwater is captured based on Figures 15 and 18. HWMU 2 is not a potentially significant source of contamination and is not retained for further evaluation.

<u>SWMU 37 Solid Waste Transfer Area</u> – This unit was used to temporarily store accumulated solid wastes before disposal or recycling. Currently, the Transfer Area is used as a contractor staging area. The Transfer Area is surrounded by a fence with truck access and is not lined. While there are no documented releases, spills and stains on soil were noted in 1991 during the PR/VSI. The release potential into the environment has not been assessed, due to the management of waste materials is considered a data gap; however, groundwater is captured based on Figures 15 and 18. SWMU 37 is retained for further evaluation in the RFI.

<u>SWMU 50 Former Slag Processing Area</u> – This former unit managed slag in the mid 1950s to 1960s prior to construction of the Slag Processing Area in 1965. Currently this area is grass covered and undeveloped and there are no documented releases. The release potential into the environment has not been assessed, due to the management of slag materials is considered a data gap; however, groundwater is captured based on Figures 15 and 17. SWMU 50 is retained for further evaluation in the RFI.

<u>AOC 22 Dredge Spoil Fill Area near corner of Jackson Lane and Lefferson Road</u> – This former unit was thought to be used as a fill area to contain dredged material removed during channelization of Dicks Creek; however, a review of aerial photographs indicated that this area was undisturbed during channelization. Currently this area is a paved employee parking lot and contains grass covered areas. There are no documented releases and groundwater is captured based on Figures 15 and 18. AOC 22 is not a potentially significant source of contamination and was not retained for further evaluation.

AOC 23 Dredge Spoil Fill Area near corner of Oxford State Road and North Branch of Dicks Creek – This unit is known to contain fill material debris from construction of the Electrogalvanizing Plant. The use of this area associated with placement of dredge spoils from Dicks Creek was noted during review of aerial photographs. AOC 23 consists of several grass covered hills, a pond, and uncovered fill areas. There are no documented releases. The potential for a release to occur is very low because of the materials placed in this area. The potential release into the environment, due to the management of suspected PCB impacted sediments/soils from Dicks Creek channelization is considered a data gap; however, groundwater is captured based on Figures 15 and 18. AOC 23 is retained for further evaluation in the RFI.

AOC 24 Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from North Branch of Dicks Creek to Jackson Lane Ditch (4000’) – This former unit was thought to be used as a fill area to contain dredged material removed during channelization of Dicks Creek; however, a review of aerial photographs indicated that this area was undisturbed during channelization. Currently this area is grass covered. There are no documented releases and groundwater is captured based on Figure 15 and 18. AOC 24 is not a potentially significant source of contamination and is not retained for further evaluation.

6.6 Slag Processing Area

Based on Figures 15 and 19 in the Slag Processing Area, groundwater is captured for all SWMUs and AOCs located in this area with the possible exception of those units located in the vicinity of Monroe Ditch. These units where groundwater is not captured includes most of SWMUs 38, SWMU 39 (eastern part), 40, 46, 47, 48, and 49; and AOCs 9, 12, 13, 14, 15, and 17.

SWMU 38 Closed Solid Waste Landfill by Yankee Road and Dicks Creek – This closed landfill consists of an unlined cell that covers approximately 14 acres. Wastes placed in the landfill included construction debris and residual wastes from steel-making operations. Groundwater is captured on the southwest side of the landfill based on Figures 15 and 19. This SWMU is retained for further evaluation in the RFI, as discussed in Exhibit D to Attachment 2: RFI/CMS SOW.

SWMU 39 Closed CERCLA Notification Solid Waste Landfill (includes former ponds west of Monroe Ditch) – This closed landfill consists of an unlined cell that covers approximately 31 acres. Wastes placed in the landfill included construction debris, slag, tars, and steel-making sludge. Groundwater is captured on the west side of the landfill based on Figures 15 and 19. This SWMU is retained for further evaluation in the RFI, as discussed in Exhibit D to Attachment 2: RFI/CMS SOW.

<u>SWMU 40 Closed Solid Waste Landfill on West Side of Slag Processing Area</u> – This closed landfill consists of an unlined cell that covers approximately 3 acres. Wastes placed in the landfill included slag, soils from new facility excavations, rubble, trash, tar materials, blast furnace dust, and WWTP sludges. Currently the landfill cover is inspected and mowed. There are no documented releases. The potential for a release is high because the landfill is not lined. This area has been evaluated during previous investigations (ARCADIS, Inc. 2002a) and is part of the upland sources IM for BH-08, which was completed. The release potential into the environment has not been adequately assessed, due to the management of suspected PCB material in the landfill is considered a data gap, and groundwater is not captured based on Figures 15 and 19; therefore, SWMU 40 is retained for further evaluation in the RFI.

<u>SWMU 41 Closed Solid Waste Landfill West of Slag Processing Area Access Road</u> – This closed landfill consists of two distinct unlined cells that cover approximately 14 acres. Wastes placed in the landfill included nonhazardous WWTP sludges. Currently the landfill cover is inspected and mowed. There are no documented releases; however, there have been three seeps identified along this landfill adjacent to Dicks Creek (Seeps 7, 29, 35). AK Steel installed a phytoremediation barrier to control groundwater seeps emanating from the south bank of Dicks Creek as part of interim measures (IM 12). The potential for a release into the environment has not been assessed but is believed to be high because the landfill is not lined and is considered a data gap; however, groundwater is captured based on Figures 15 and 19. SWMU 41 is retained for further evaluation in the RFI.

<u>SWMU 42 Closed Solid Waste Landfill East of Slag Processing Area Access Road</u> – This closed landfill consists of two unlined cells that cover approximately 20 acres. Wastes placed in the landfill included nonhazardous WWTP sludges and dust from several plant operations. Currently the landfill cover is inspected and mowed. There are no documented releases. The potential for a release is high because the landfill is not lined; however, data from the site-wide groundwater monitoring program has not indicated a release has occurred from this landfill, and groundwater is captured based on Figures 15 and 19. SWMU 42 is not a potentially significant source of contamination and is not to be retained for further evaluation.

<u>SWMU 43 Closed Solid Waste Landfill</u> – This closed landfill consists of an unlined cell that covers approximately 28 acres. Wastes placed in the landfill included

nonhazardous WWTP sludges and dust from several plant operations. Landfill 1 (SWMU 43) is classified as a Class III residual waste landfill. Currently the landfill cover is inspected and mowed. AK Steel implements a groundwater monitoring program for this landfill. The potential for a release is high because the landfill is not lined; however, there are no documented releases, and groundwater is captured based on Figures 15 and 19. This unit is regulated under the Ohio EPA solid waste program. A groundwater monitoring program is currently being implemented at this landfill and a statistical evaluation is conducted on a semi-annual basis by comparing upgradient versus downgradient wells. SWMU 43 is not a potentially significant source of contamination and is not to be retained for further evaluation.

SWMU 45 Interceptor Trench and Treatment System – This SWMU will be further evaluated as discussed in Attachment 1: IM SOW to the Consent Decree.

SWMU 46 Current Oil Storage Area – This active SWMU consists of five aboveground storage tanks and several drums used to store oil. Releases have occurred at this SWMU and no engineered controls are in place. The release potential into the environment has not been assessed, due to the management of oils in this area is considered a data gap. Groundwater is not captured based on Figures 15 and 19. SWMU 46 is retained for further evaluation in the RFI.

SWMU 47 Former Oil Separator Ponds and vicinity – This inactive unit consisted of three rectangular ponds, two small rectangular ponds and smaller circular ponds. There were no documented releases from this SWMU and there were no engineered controls in place. SWMU 47 has been characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). The release potential into the environment has not been adequately assessed, due to the management of PCB material in the ponds is considered a data gap, and groundwater is not captured based on Figures 15 and 19; therefore, SWMU 47 is retained for further evaluation in the RFI.

SWMU 48 Existing Fueling Area in SW part of Slag Processing Area – This active SWMU consists of two aboveground storage tanks used to store fuel. Releases have occurred at this SWMU. Engineered controls are in place, including secondary containment. The release potential into the environment has not been assessed, due to the management of petroleum fuels in this area is considered a data gap, and groundwater is not captured based on Figures 15 and 19; therefore, SWMU 48 is retained for further evaluation in the RFI.

SWMU 49 Former Kish Quenching Area – This inactive unit is used to quench kish pots prior to dumping to control air-borne emissions. There are no documented releases from this unit. The release potential into the environment has not been assessed, due to the management of suspected PCB material during the former quenching activities is considered a data gap, and groundwater is not captured based on Figures 15 and 19; therefore, SWMU 49 is retained for further evaluation in the RFI.

AOC 9 PCB Seep Area East of Outfall 002 on South side of Dicks Creek – This AOC will be further evaluated as discussed in Attachment 1: IM SOW to the Consent Decree.

AOC 10 PCB Seep Area Near Bend in Monroe Ditch – This AOC will be further evaluated as discussed in Attachment 1: IM SOW to the Consent Decree.

AOC 11 Mill Scale Area 1 – This active AOC is used to stockpile mill scale. There are no documented releases and no engineered controls in place. AOC 11 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). Groundwater is not captured based on Figures 15 and 19. This AOC is not retained for further evaluation in the RFI.

AOC 12 Mill Scale Area 2 – This active AOC is used to stockpile mill scale. There are no documented releases and no engineered controls in place. AOC 12 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). Groundwater is not captured based on Figures 15 and 19. This AOC is not retained for further evaluation in the RFI.

AOC 13 Mill Scale Area 3 – This active AOC is used to stockpile mill scale. There are no documented releases and no engineered controls in place. AOC 13 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). Groundwater is not captured based on Figures 15 and 19. This AOC is not retained for further evaluation in the RFI.

AOC 14 Raw Slag Area – This active AOC is used to manage raw slag. There are no documented releases and no engineered controls in place. AOC 14 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). Groundwater is not captured based on Figures 15 and 19. This AOC is not retained for further evaluation in the RFI.

AOC 15 Finished Slag Area – This active AOC is used to manage finished slag. There are no documented releases and no engineered controls in place. AOC 15 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). Groundwater is not captured based on Figures 15 and 19. This AOC is not retained for further evaluation in the RFI.

AOC 16 7 Oil Transformer Locations ("T" in Slag Processing Area) – This AOC consists of oil transformers in the Slag Processing Area. There are no documented releases and no engineered controls in place. AOC 16 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). Groundwater is not captured, except one transformer location area near SWMU 49 based on Figures 15 and 19. This AOC is not retained for further evaluation in the RFI.

AOC 17 Former Drainage Path from Former Oil Ponds (SWMU 47) – This AOC has been remediated in accordance with Attachment 1: IM SOW to the Consent Decree, as described in Section 4.5.4.

6.7 Additional Areas of Potential Concern

The two AOCs identified as Additional Areas of Potential Concern (AOCs 18 and 19), as well as AA-01, are located in the Dicks Creek floodplain. Therefore, they have been evaluated as discussed in Section 4 and Attachment 1: IM SOW to the Consent Decree. Based on Figure 15 and Figure 19 for the Additional Areas, groundwater is captured for all AAs located in this area with the possible exception of AA-07. The release potential into the environment has not been assessed, because the management of PCB material in the sediments/soils during Dicks Creek channelization is considered a data gap. Therefore, eight AAs (AA-02 through AA-09) are retained for further evaluation in the RFI.

6.8 Screening of Facility Releases

There are several reported spills or releases associated with operations at the plant that were presented in Section 2.6. The majority of the releases were caused predominantly by equipment failure (i.e., piping, pumps). Each spill was promptly managed by applying mitigation controls (i.e., absorbent material) and remediation practices (i.e., excavation, liquid recovery, neutralization agent). Based on AK Steel's management practices for previous releases of diesel fuel, coke oven gas, and SPL, these release areas will not be retained for further evaluation. As discussed in Section

6.3, the flushing liquor releases will be combined with AOC 6 and are retained for further evaluation in the RFI.

7. Summary of SWMUs/HWMUs/AOCs/AAs Requiring Further Action

The SWMUs/HWMUs/AOCs/AAs retained for further evaluation are highlighted below. Specific Work Plans will be developed for release determination, nature and extent of contamination if a release has occurred and the significance of the impact of contamination if a release has occurred for each of the retained units as defined in Part 1 of Attachment 2 RFI/CMS SOW in the Consent Decree. These units have been assembled into groups that are defined below. Preliminary SCMs have been developed for each unit grouping building off of the preliminary site-wide SCM presented in Section 3.

- North Plant Area: Of the nine SWMUs identified at the North Plant Area, seven are recommended for further evaluation. SWMUs 2 through 4 and SWMUs 6 through 9 have been retained for further evaluation in the RFI.

- Melt Plant Area: Of the 13 SWMUs and eight AOCs identified in the Melt Plant Area, ten of these areas are recommended for further evaluation. SWMUs 11, 15, 16, 17 and 20 and AOCs 1, 2, 4, 6, and 21 are retained for further evaluation in the RFI.

- Former Coil Paint Area (SWMU 23): SWMU 23 is retained for further evaluation in the RFI.

- South Plant Area: Of the nine SWMUs, two HWMUs, and three AOCs identified in the South Plant Area, four of these areas are recommended for further evaluation. SWMUs 31, 37 and 50 and AOC 23 are retained for further evaluation in the RFI.

- Slag Processing Area: SWMUs 38 and 39 are retained for further evaluation as discussed in Exhibit D to Attachment 2: RFI/CMS SOW. SWMU 45 and AOCs 9, 10, and 17 will be further evaluated as discussed in Attachment 1: IM SOW to the Consent Decree. SWMUs 40, 41, 46, 47, 48 and 49 are retained for further evaluation in the RFI.

- Additional Areas of Potential Concern: AOCs 18 and 19, as well as AA-01, are within the Dicks Creek floodplain and are being addressed as described in Section 4 and Attachment 1: IM SOW to the Consent Decree. The remaining eight AAs (AA-02 through AA-09) are retained for further evaluation in the RFI.

7.1 Unit Groupings for Further Evaluation

The retained units have been grouped to facilitate further evaluation based primarily on plant area. Further evaluation will be conducted in a coordinated manner for these proposed groupings. The following lists the proposed groupings. The prioritization for the groupings will be included in the Project Management Plan.

North Plant Area

- SWMU 2 - North Terminal WWTP Concentrator Pit
- SWMU 3 - Terne Coat Flux Hazardous Waste Storage Area
- SWMU 4 - Terne Coat Dross Bucket Storage Area
- SWMU 6 - PCB Storage Area (Door 7)
- SWMU 7 - Former Used Oil Reclamation Facility (Door 55A)
- SWMU 8 - Used Oil Reclamation Facility Number 2
- SWMU 9 - Former Used Oil Reclamation Facility Number 3 (Door 179A)

Melt Plant Area

- SWMU 11 -Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds
- SWMU 15 - Former Coal Tar Decanter Sludge Recycling Area
- SWMU 16 - Former Coal Tar Decanter Sludge Collection Bin
- SWMU 17 - Northern Section of Former North Tar Lagoon (Near Robin Hood Coal Pile)
- SWMU 20 - Former Benzol Tank Farm Area (including Tar Tank Sludge Storage Area)
- AOC 1 - Coke Quenching Water Collection Plant
- AOC 2 - Tar Tanks
- AOC 4 - Former Rail Car Transfer Area
- AOC 6 - Stormwater Sump and Release Areas
- AOC 21 - Dredge Spoil Fill Area – E/W diagonal fill area between Melt Area and South Plant (2,000 feet on both sides of Jackson Land Ditch)

South Plant Area

- SWMU 31 - South Terminal Used Oil Recovery Facility
- SWMU 37 - Solid Waste Transfer Area
- SWMU 50 - Former Slag Processing Area
- AOC 23 - Dredge Spoil Fill Area near corner of Oxford State Road and North Branch of Dicks Creek

Slag Processing Area

- SWMU 40 - Closed Solid Waste Landfill on West Side of Slag Processing Area
- SWMU 41 - Closed Solid Waste Landfill West of Slag Processing Area Access Road
- SWMU 46 - Current Oil Storage Area
- SWMU 47 - Former Oil Separator Ponds and Vicinity
- SWMU 48 - Existing Fueling Area in SW part of OMS
- SWMU 49 - Former Kish Quenching Area

SWMUs 38 and 39

- SWMU 38 - Closed Solid Waste Landfill by Yankee Road and Dicks Creek
- SWMU 39 - Closed CERCLA Notification Solid Waste Landfill

Additional Areas

- AA02 through AA09

Miscellaneous

- SWMU 23 - Former Coil Paint Wastewater Treatment Lagoons
- TCE Plume (GM-27S)

7.2 Preliminary SCMs for the Unit Groupings

The sections below present the preliminary SCM for both human health and ecological pathways and receptors based on the present knowledge of the potential source areas and release mechanisms. This preliminary SCM will be updated as additional data is collected during the completion of RFI activities. The SCM illustrates potential contaminant distributions, release mechanisms, exposure pathways and migration routes, and receptors. The SCM design is based on existing site data compiled during previous investigations and development of the CCR. One of the most important aspects of the SCM development process is to identify and characterize all potential exposure pathways and receptors at the site by considering site conditions, and the properties of contaminants present at the site. Once a basic understanding of the site had been attained, the SCM diagram was constructed to represent the linkages among potential contaminant sources, release mechanisms, exposure pathways and routes, and receptors. This information was used to summarize the current understanding of site conditions.

Individual units requiring further evaluation were categorized as one of the following five primary potential sources: (1) below ground pits, sumps, and basins; (2) plant operation areas; (3) above ground storage areas; (4) landfills, ponds, and lagoons; (5) and PCB dredge spoils. Potential release mechanisms were identified for each primary source. The following release mechanisms are possible at the site: spills and leaks; leaching; percolation or runoff; or volatilization. Potential release mechanisms from above ground storage areas could include spills during filling/transfer or leakage due to cracks. Because the landfills, ponds, and lagoons are typically unlined, compounds contained in each of these units have the potential to leach, percolate, run off, or volatilize from the source. Potential release mechanisms from below ground pits, sumps, and basins could include leakage from cracked concrete foundations or walls and volatilization from open-topped or vented containers. Potential release mechanisms from plant operation areas could be spills or leaching if the flooring is cracked. Potential release mechanisms for the PCB dredge spoils include leaching, percolation, or runoff. Potential release mechanisms for specific units were determined by considering unit-specific information such as type of waste being managed, method of storage, and engineering controls. Figures 20 through 28 present the preliminary SCMs for the unit groupings.

While no migration pathways are identified from SWMUs/HWMUs/AOCs/AAs to the Great Miami River, the river is included in the RFI as it relates to Outfall 011 (Figure 20). For clarity, a separate SCM diagram is also provided for Dicks Creek (Figure 21), which may receive chemical inputs from several of the unit groupings. For the Great Miami River, Dicks Creek, and each of the unit groupings, a SCM diagram was constructed by combining information on sources and migration pathways (described above) with the human health and ecological exposure pathways and receptors identified in Sections 3.2.8 and 3.2.9.

Human exposures in aquatic areas are associated with recreational use (Dicks Creek, Great Miami River) or with maintenance work and/or trespassing (Monroe Ditch). Human exposure pathways identified for soil and groundwater contaminants are similar among the unit groupings, reflecting in part the inclusive nature of the preliminary SCMs in the absence of data to rule out specific exposure pathways. Generally, on-site receptors include maintenance workers, routine workers, and trespassers, although no routine workers are present in the SWMU 38/39 unit grouping. Potentially complete off-site exposure pathways are generally associated with possible future groundwater migration and possible dispersion of airborne contaminants from the site. Exposures to off-site soil contamination associated with historical placement of dredged material from Dicks Creek are also possible in the Additional Areas unit grouping. Ecological exposure pathways are primarily associated with aquatic habitat (Monroe Ditch, Dicks Creek, and the Great Miami River). In addition, terrestrial ecological exposures will be further evaluated for the wooded area adjacent to SWMU 23.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

NORTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 1: North Terminal Wastewater Treatment Plant (WWTP)	Active	This WWTP receives and treats wastewater from the Air Products Facility, # 3 Zinc Grip and the North Plant Area including the North Terminal WWTP Concentrator Pit (SWMU 2). The sludge generated by the WWTP is characterized as non-hazardous for metals, based on laboratory analysis.	There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place and wastes are stored in containers on paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 16.	The North Terminal WWTP is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 2: North Terminal WWTP Concentrator Pit	Active	The Concentrator Pit receives wastewaters that are eventually transferred to the North Terminal WWTP (SWMU 1) for treatment via two pumps. Miscellaneous mill wastewaters transported via vacuum truck and rainwater are currently the primary components of the wastewater handled in the Concentrator Pit.	There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place and the wastewaters are stored in a reinforced concrete basin. The release potential into the environment, due to the unknown integrity of the concrete basin is considered a data gap; however, groundwater is captured based on Figures 15 and 16.	The North Terminal WWTP Concentrator Pit is not a potentially significant source of contamination but is retained for further evaluation due to unknown integrity of the concrete basin.
SWMU 3: Terne Coat Flux Hazardous Waste Storage Area	Inactive	This inactive storage area contained flux skimmings stored in drums. Flux skimmings contain lead and cadmium. Currently this area is used as less than 90 day storage area for hazardous wastes.	While minor releases have occurred, they were contained by a concrete floor and cleaned up. Some spillage and floor staining was noted in 1991 during the PR/VSI visit. The potential for a release to occur was very low because this unit had engineered controls in place and wastes were stored in containers on a paved surface inside a building. The release potential into the environment, due to the unknown integrity of the concrete floor is considered a data gap; however, groundwater is captured based on Figures 15 and 16.	The Terne Coat Flux Hazardous Waste Storage Area is not a potentially significant source of contamination but is retained for further evaluation due to unknown integrity of the concrete floor.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

NORTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 4: Terne Coat Dross Bucket Storage Area	Inactive	This inactive storage area formerly contained dross buckets. Dross contains lead.	While documented releases did not occur, some spillage was noted in 1991 during the PR/VSI. The potential for a release to occur was very low because this unit had engineered controls in place and wastes were stored in containers on a paved surface inside a building. Additionally, dross is a solid. The release potential into the environment, due to the unknown integrity of the floor is considered a data gap; however, groundwater is captured based on Figures 15 and 16.	The Terne Coat Dross Bucket Storage Area is not a potentially significant source of contamination but is retained for further evaluation due to unknown integrity of the floor.
SWMU 5: Terne Coat Satellite Accumulation Area	Inactive	This inactive accumulation area formerly contained terne flux skimmings stored in a drum. Flux skimmings contain lead and cadmium.	There were no documented releases. The potential for a release to occur was very low because this unit had engineered controls in place and terne flux skimmings were stored in a drum on a paved surface inside a building. These controls would have likely prevented a release from reaching soil and groundwater is captured based on Figures 15 and 16.	The Terne Coat Satellite Accumulation Area is not a potentially significant source of contamination and is not retained for further evaluation.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

NORTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 6: PCB Storage Area (Door 7)	Inactive	This inactive storage area formerly stored PCB-containing and PCB-contaminated equipment and PCB-contaminated soils.	There were no documented releases. The potential for a release to occur was very low because this unit had engineered controls in place and equipment was stored on a concrete surface, enclosed by a chain link fence, inside a building. These controls would have likely prevented a release from reaching soil. The release potential into the environment, due to the management of PCB materials and presence of a sump in the storage area is considered a data gap; however, groundwater is captured based on Figures 15 and 16.	The PCB Storage Area is not a potentially significant source of contamination but is retained for further evaluation due to the presence of the sump and historic management of PCB materials.
SWMU 7: Former Used Oil Reclamation Facility (Door 55A)	Inactive	This inactive unit formerly consisted of a below-grade concrete collection pit, three oil/water separation tanks, reclaimed oil storage tanks and pumps and piping. This unit accepted used oil from the cold mills. Most of the tanks and ancillary equipment (except reclaimed oil storage) were located inside a building. The oil was recycled and reused at the plant.	There were no documented releases. The potential for a release to occur was very low because this unit had engineered controls in place, including secondary containment. These controls would have likely prevented a release from reaching soil. The release potential into the environment, due to the management of used oils in the area is considered a data gap; however, groundwater is captured based on Figures 15 and 16.	The Former Used Oil Reclamation Facility (Door 55A) is not a potentially significant source of contamination but is retained for further evaluation due to the management of used oils.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

NORTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 8: Used Oil Reclamation Facility Number 2	Active	This active unit consists of three oil/water separator tanks, an oil skimmer pit and an aboveground outdoor tank. This unit accepts and temporarily stores used oils and oily-waters from the Temper Mills. Most of the tanks and ancillary equipment (except reclaimed oil storage) are located inside a building. Used oils and oily-waters are transferred via truck to the South Terminal Used Oil Recovery Facility (SWMU 31) for further processing.	There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place, including paved surfaces and secondary containment. These controls would likely prevent a release from reaching soil. The release potential into the environment, due to the management of used oils in the area is considered a data gap; however, groundwater is captured based on Figures 15 and 16.	The Used Oil Reclamation Facility Number 2 is not a potentially significant source of contamination but is retained for further evaluation due to the management of used oils.
SWMU 9: Former Used Oil Reclamation Facility Number 3 (Door 179A)	Inactive	This inactive unit formerly consisted of a below-grade concrete collection pit, three oil/water separation tanks, and an aboveground tank. This unit accepted used oil via tanker trucks. The oil was recycled and reused at the plant.	There were no documented releases. The potential for a release to occur was very low because this unit had engineered controls in place, including paved surfaces and secondary containment. These controls would have likely prevented a release from reaching soil. The release potential into the environment, due to the management of used oils in the area is considered a data gap; however, groundwater is captured based on Figures 15 and 16.	The Former Used Oil Reclamation Facility Number 3 is not a potentially significant source of contamination but is retained for further evaluation due to the management of used oils.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 10: Dorr Thickener and East Aboveground Tank	Active	This unit consists of a 25-foot high aboveground concrete structure which receives gas scrubbing wastewater from the blast furnace scrubber and an overflow tank.	There are no documented releases. The potential for a release to occur is low because this unit has engineered controls in place, including the units are composed of reinforced concrete over paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 17.	The Dorr Thickener and East Aboveground Tank is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 11: Blast Furnace/ Sinter Plant Wastewater Treatment Sludge Ponds	Active	This unit contains two unlined ponds used to manage wastewater from the Melt Plant operations. The ponds were installed in 1952 and are currently in operation, with the Sinter Plant being in operation between 1972 and 2003. The sludge deposited in the ponds is characterized as non-hazardous, based on laboratory analysis.	There are no documented releases. The potential for a release to soil and groundwater is moderate because the lagoons are unlined. A release assessment has not been completed and is considered a data gap; however, groundwater is captured based on Figures 15 and 17.	The Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds are retained for further evaluation in the RFI.
SWMU 12: Blast Furnace/ Sinter Plant Wastewater Treatment Facility	Active	This wastewater treatment facility consists of three clarifiers that receive wastewater from the Blast Furnace/Sinter Plant Wastewater Treatment Plant Sludge Ponds (SWMU 11). The sludge generated by the WWTP is characterized as non-hazardous for metals, based on laboratory analysis.	There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place and wastewaters are stored in tanks on paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 17.	The Blast Furnace/Sinter Plant Wastewater Treatment Facility is not a potentially significant source of contamination and is not retained for further action evaluation.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 13: BOF Wastewater Treatment Facility	Active	This wastewater treatment facility consists of a hydroclone, two clarifiers, vacuum filters and sludge transfer station that receive wastewater from the BOF scrubbing activities. The sludge generated by the WWTP is characterized as non-hazardous for metals, based on laboratory analysis.	There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place and wastes are managed in containers on paved surfaces. At this time, some clarifier fines are stored temporarily on the ground. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 17.	The BOF Wastewater Treatment Facility is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 14: Coke Plant Wastewater Equalization Tank	Active	This unit consists of a one million gallon above ground steel tank used to store wastewater containing ammonia from the Coke Plant. The tank system includes a reinforced concrete pad, beneath the tank and flow controls are used to regulate discharge flow that is equipped with a siphon breaker. The wastewater from this tank is discharged to the City of Middletown Wastewater Treatment Plant for further treatment.	There are no documented releases to the environment. The potential for a release to occur is very low because this unit has engineered controls in place, including reinforced concrete surfaces and secondary containment installed since the PR/VSI visit was conducted in 1991. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 17.	The Coke Plant Wastewater Equalization Tank is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 15: Former Coal Tar Decanter Sludge Recycling Area	Inactive	This inactive sludge recycling area was operated by AKJ Industries, Inc. and formerly managed tar decanter sludge (TDS) generated from coking operations during the period from 1990 through 1995. The equipment has been decommissioned and only the concrete pad and berms remain.	Documented releases included some staining associated with steam pipes condensate and coal tar spillage noted inside and outside the berm were noted during the 1992 PR/VSI report. There are documented releases and a release assessment has not been completed, this is considered a data gap; however, groundwater is captured based on Figures 15 and 17.	The Former Coal Tar Decanter Sludge Recycling Area is retained for further evaluation in the RFI.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 16: Former Coal Tar Decanter Sludge Collection Bin	Inactive	This inactive unit contained collection bins used to handle coal tar decanter (TDS) sludge from the coking operations. The equipment has been decommissioned and only the concrete pad remains.	There are no documented releases from this unit; however, an Ohio EPA investigation in 1990 identified K087 waste in soil prior to installation of the secondary containment and in 1992 identified the presence of benzene in waste on the concrete pad. This unit had engineered controls installed in the early 1990s, with the bins being stored on pervious surfaces, prior to this time. There is potential for release of TDS into the environment and a release assessment has not been completed and is considered a data gap; however, groundwater is captured based on Figures 15 and 17.	The Former Coal Tar Decanter Sludge Collection Bin is retained for further evaluation in the RFI.
SWMU 17: North Section of Former Northern Tar Lagoon (Near the Robin Hood Coal Pile)	Inactive	Prior to the Robin Hood Coal Pile storage area, the foot print of the tar lagoons were present beneath much of the eastern end of the coal pile. The operations of the tar lagoons were observed in the aerial photographs between March 1956 and June 1966. In 2000 RCRA closure certification for the Robin Hood Coal Pile was achieved.	In 1990, the residual tar beneath the eastern end of the coal pile was excavated and transported for off-site disposal, except the northern section of one of the former tar ponds. The release potential into the environment has not been assessed in the northern section of the former tar lagoon and is considered a data gap; groundwater is not captured based on Figures 15 and 17.	The Robin Hood Coal Pile portion of SWMU 17 does not require further evaluation. The North Section of Former Northern Tar Lagoon is retained for further evaluation.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 18: Former Open Hearth WWTP	Inactive	This former wastewater treatment facility consisted of clarifiers and vacuum filters that received wastewater from a gas cleaning scrubber system from the Open Hearth Furnace and water from the BOF.	There are no documented releases. The potential for a release to occur was low as this unit likely had engineered controls in place and wastes would have been stored in containers on paved surfaces. These controls would likely prevent a release from reaching soil. In addition, groundwater is captured based on Figures 15 and 17.	The Former Open Hearth WWTP is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 19: Former Used Oil Storage Area	Inactive	According to the PR/VSI this area was constructed of concrete with no secondary containment. The PR/VSI also stated that used oil from various plant processes was transported to the Used-Oil Storage Area where it was mixed with fuel oil and stored in 55-gallon drums until reused in the plant. During the CCR site visit an AK Steel representative indicated that this unit was inaccurately described during the PR/VSI as an oil storage area because the area was not routinely used for that purpose, but rather was an area designated for the mason's cleaning of refractory equipment.	There are no documented releases in this area area and groundwater is captured based on Figures 15 and 17.	The Former Used Oil Storage Area is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 20: Former Benzol Tank Farm Area (including Tar Tank Sludge Storage Area)	Inactive	This unit was part of a byproduct recovery facility associated with the Coke Plant. In addition to a tank farm the facility contained various distillation columns, heat exchangers, and piping. The facility was used to recover benzene and various products created as a byproduct from coking-operation. The tank farm consisted of a series of aboveground storage tanks containing recovered fuels.	There have been no documented releases. Engineered controls in the form of secondary containment were in place. The release potential into the environment has not been assessed and the management of coke by-products in this area is considered a data gap. Groundwater is not captured based on Figures 15 and 17.	The Former Benzol Tank Farm is retained for further evaluation in the RFI.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 21: Former Used Oil Accumulation Area (by Sinter Plant)	Inactive	This area was used as a staging area for drums containing used oil. These drums were staged on a concrete pad prior to recycling. The period of operation and exact location are unknown, due to the Sinter Plant and surrounding structures being demolished sometime after 2003.	There are no documented releases related to the Former Used Oil Accumulation Area, though during the PR/VSI oil-stained soil was observed near the drums. In addition, groundwater is captured based on Figures 15 and 17.	The Former Used Oil Accumulation Area by the Sinter Plant is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 44: Coke Oven Gas Pipeline and Release Area	Inactive	The Coke Oven Gas Pipeline transported Coke Oven Gas (COG). COG is a resultant vapor created from the transformation of coal into coke in the coke ovens.	On January 24, 1996 Coke Oven Gas Pipeline release was reported. From April 1996 through March 1998, corrective actions were implemented by installing a soil vapor extraction (SVE) system to remediate the shallow impacted soils. The groundwater was remediated by injecting an oxidizer solution to enhanced attenuation. AK Steel purchased ten residential parcels to the west of the property line, and permanently removed the COG line. The most recent (August 2007) laboratory analytical results in groundwater indicated that benzene concentrations were below laboratory detection levels from the monitoring well network. Furthermore, groundwater is captured based on Figures 15 and 17.	The Coke Oven Gas Pipeline and Release Area has been adequately characterized during previous investigations and is not retained for further evaluation.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
AOC 1: Coke Quenching Water Collection Plant	Active	This unit consists of a rectangular shaped basin that collects water used to cool hot coke removed from the coking ovens. The water collected is recycled back to the adjacent quenching tower.	During the PR/VSI it was noted that it was possible for coke particles to settle out of the water and accumulate in the basin. No hazardous constituents have been identified in this unit. There are no documented releases. The release potential into the environment, due to the unknown integrity of the concrete basin is considered a data gap; however, groundwater is captured based on Figures 15 and 17.	The Coke Quenching Water Collection Plant is not a potentially significant source but is retained for further evaluation due to the unknown integrity of the concrete basin.
AOC 2: Tar Tanks	Inactive, (In April 2000, a new 394,000 gallon tar tank brought into service.	The tanks were installed in the early 1950s and consisted of a riveted 635,000-gallon capacity tank (west tank) and a larger welded 700,000-gallon capacity tank (east tank). The western tar tank was decommissioned and demolished in the spring of 1994 and the eastern tar tank was decommissioned (taken out of service) in June 2008. In 1993 the Tar Tanks were retro-fitted with mixers to keep heavy particles suspended and decrease the accumulation of sludges at the base of the tanks. The tar tank facility stores coal tar pumped over from the batteries to allow settling time prior to shipment to off-site customers. Until 1993 the Tar Tanks were located on a slag and sand bed surrounded by an earthen berm constructed in the 1960s. After the classification of coal tar bottoms by the EPA in July 1992, AK Steel built a secondary containment system. In 1993 each tank was modified with a new false bottom welded circumferentially to the side walls above an eight inch layer of sand. Leak detection valves were installed in the annulus to detect future tank floor leakage. Outside the tanks a 30-foot high steel ring wall was installed with a steel bottom welded to the base of each tank to provide additional secondary containment. In addition a new concrete area common to both tanks was installed to prevent ground contact of materials during future tank cleanouts.	Prior to the installation of the secondary containment measures wastes related to the cleanout of the Tar Tanks were placed directly on the ground adjacent to the tanks. During an Ohio EPA site visit in 1990, 13,000 gallons of cleanout waste was observed on the ground within the earthen bermed area. A total of three documented tar spills at the tanks or tar loading station occurred in 1992 (500 gallons) and 1994 (30 and 100 gallons). The release potential into the environment has not been assessed, due to the management of coke by-products in the former tar tanks is considered a data gap; however, groundwater is captured based on Figures 15 and 17.	The former Tar Tanks are retained for further evaluation in the RFI.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
AOC 4: Former Rail Car Transfer Area	Inactive	This former unit rail car loading area consisted of three bays with piping used to dispense by-products to railcars from the plant. According to plant drawings each bay managed different by-products. The westernmost bay managed "Pure Benzol" and "Pure Toluol", the center bay managed "Pure Still Residue", "Motor Benzol", "Crude Residue", and "Pure Benzol", and the easternmost bay managed "Solvent Naptha", "Xylol", and "Pure Benzol". The truck bay managed "Pure Benzol" and "Pure Toluol". During production a drip pad was used to contain spills.	There are no documented releases, but the potential for a release was high. The release potential into the environment has hot been assessed, due to the management of coke by-products is considered a data gap. Groundwater is not captured based on Figures 15 and 17.	The Former Rail Car Transfer Area is retained for further evaluation in the RFI.
AOC 5: PCB Transformer Storage Building (next to Former Open Hearth WWTP)	Inactive	This unit consists of a corrugated metal building which currently houses non-PCB containing transformers and associated equipment. The operations in the building began in 1970, use as a PCB-storage area began after that time. By approximately 2000, AK Steel disposed of all of its PCB contaminated equipment.	There are no documented releases and the potential for a release is low. The building has a concrete floor and is secured and groundwater is captured based on Figures 15 and 17.	The PCB Transformer Storage Building is not a potentially significant source of contamination and is not retained for further evaluation.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
AOC 6: Stormwater Sump and Release Areas	Active	The Stormwater Sump was misidentified in the 1992 PR/VSI. The below-grade concrete pit collects stormwater from the surrounding curbed area including runoff from the Former Coal Tar Decanter Sludge Collection Bin (SWMU 16) and condensation from the coke oven gas line. Additionally, there have been five flushing liquor releases in the vicinity of this area, where large quantities of flushing liquor were recovered in the sump (AOC 6).	There is no documentation of any releases associated with the Stormwater Sump unit; however, there were three releases of flushing liquor from upstream operations, where large quantities of flushing liquor were recovered in the sump. The incidental release of 25,000, 50,000, and 50,000 gallons of flushing liquor occurred in May 1991, July 1991, and June 1992, respectively. During the PR/VSI, green-colored liquid was observed next to the sump. AK Steel attributed this to algal blooms and, therefore, it was assumed that this liquid was ammonia-containing, which may indicate local releases of nitrogen-rich fluids such as flushing liquor. The collection sump is constructed of concrete. The release potential into the environment has not been assessed, due to the management of coke by-products is considered a data gap; however, groundwater is captured based on Figures 15 and 17.	The Stormwater Sump and Release Areas are retained for further evaluation in the RFI.
AOC 8: Benzene Release Area Possibly Related to AOC 2 Tar Tanks	Inactive	This area is defined by monitoring well GM-4S and is located approximately 200 yards southwest of the Tar Tanks (AOC 2). Currently the area is a fenced-in portion of the southern Melt Area. The Benzene Release Area has been characterized by the increased concentrations of benzene in monitoring well GM-4S which was installed in 1989. The extent of the plume was delineated during several phases of investigation, and the concentration of benzene has continued to attenuate naturally over time.	While benzene was initially detected in GM-4S in 1989, benzene has not been detected in GM-4S since the 1998 annual groundwater sampling event. Furthermore, groundwater is captured based on Figures 15 and 17.	The Benzene Release Area Possibly Related to AOC 2 has been adequately characterized during previous investigations and is not retained for further evaluation.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

MELT PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
AOC 20: AK/Armco Property at Oxford State Road (NS) and Ottawa Street (WS)	Inactive	This area is a rectangular parcel of land located on the south side of Oxford State Road near the Coke Plant Gate entrance. AK Steel purchased this land in the early 1990s to allow access for further delineation of the benzene plume (AOC 8) associated with the Tar Tanks (AOC 2) to the north. Currently the property is surrounded by a chain-link fence and is vacant. Benzene concentrations in monitor wells on this property have decreased over time and the last detectable concentrations on this property was at GM-54S (10 ug/L) during the March 1999 site-wide monitoring event, with no detectable concentration of benzene present in subsequent annual sampling events up through 2009.	There have been no documented releases associated with this property. Groundwater is not captured based Figures 15 and 17.	The Property at Oxford State Road near the Coke Plant entrance is not a potentially significant source of contamination and is not retained for further evaluation.
AOC 21: Dredge Spoil Fill Area – E/W diagonal fill area between Melt Area and South Plant (2000 feet on both sides of Jackson Lane Ditch)	Inactive	This area is located in the southeast corner of the Melt Area. The original plan for the area included two fill areas separated by what is now a road. Area 1 was approximately 225 feet by 725 feet. Area 2 was south and east of Area 1 and extended approximately 950 feet by 325 feet. A total surface area of approximately 1,300 square feet was designated as the Dredge Spoil Fill Area. This dredge spoil fill area was to accept the soil removed during channelization activities in Dicks Creek. A review of aerial photographs was inconclusive. During the time Dicks Creek was channelized this area of the Melt Plant was undergoing construction of the BOF Mold Yard Building, it cannot be distinguished if the disturbed soil is related to construction activities or is dredge spoils.	There are no documented releases in this area. The release potential into the environment has not been assessed, due to the management of suspected PCB impacted sediments/soils from Dicks Creek channelization is considered a data gap; however, groundwater is captured based on Figures 15 and 17.	AOC 21 will be retained for further evaluation in the RFI.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

COIL PAINT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 23: Former Coil Paint Wastewater Treatment Lagoons	Inactive	This unit contained three unlined wastewater lagoons associated with the former Coil Paint Wastewater Treatment Plant (WWTP). A total of three unlined wastewater treatment lagoons were in operation from 1971 to 1978. The lagoons were installed in a sand and gravel area west of the Coil Paint Building. Two of the lagoons were used to remove suspended solids from the Coil Paint wastewater stream. The third pond was used to capture wastewater overflowing from the two lagoons, where the water was percolated through a sand and gravel bed into groundwater. During operation, wastewater containing metals associated with the operations at the Coil Paint Plant were discharged in the lagoons. In the mid-1980s, the lagoons were backfilled and capped with a vegetated soil cover.	There were no documented releases. With current groundwater flow to the northeast, existing monitoring wells that are upgradient (GM-1S, GM-1D) and sidegradient (GM-2S) do not currently contain detectable levels of VOCs. The release potential into the environment has not been assessed, due to the unlined lagoons is considered a data gap. Based on Figure 15 for SWMU 23, groundwater is captured in this area.	The Former Coil Paint Wastewater Treatment Lagoons are retained for further evaluation in the RFI.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SOUTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 28: South Terminal WWTP	Active	This WWTP receives and treats wastewater from the cold mill operations, two pickle rinse wastewater streams, and the Electrogalvanizing Line rinse water from holding tanks. The sludge generated by the WWTP is characterized as non-hazardous for metals, based on laboratory analysis.	There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place, is continuously monitored by instrumentation and plant personnel, and wastes are stored in containers on paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 18.	The South Terminal WWTP is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 29: South Terminal Wastewater Treatment Polishing Ponds	Active	This unit receives treated water from SWMU 28 for further polishing. The ponds are clay lined. Approximately every 10 years, the ponds are pumped for removal of sediment/sludge and the material is disposed off-site.	There are no documented releases. The potential for a release to occur is very low because this unit receives treated wastewater and the ponds are periodically pumped. These controls would likely prevent a release from reaching soil or surface water and groundwater is captured based on Figures 15 and 18.	The South Terminal Wastewater Treatment Polishing Ponds are not a potentially significant source of contamination and are not retained for further evaluation.
SWMU 30: Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets	Inactive	This former unit was designed to contain upsets from SWMU 28. The pond was not lined. The pond was used to temporarily store staging material from SWMU 28 operations and material pumped from SWMU 29 prior to being disposed.	There are no document releases and no upsets from SWMU 28 occurred. The potential for a release to occur was very low because this unit was used for temporary storage and a release to soil or surface water was not documented during the period of time the storage occurred. In addition, groundwater is captured based on Figures 15 and 18.	The Former Emergency Ponds are not a potentially significant source of contamination and are not retained for further evaluation.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SOUTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 31: South Terminal Used Oil Recovery Facility	Active	This unit consists of three oil/water separator tanks, an aboveground outdoor tank, and three horizontal tanks for oil reclamation. The oil is recycled and reused at the plant as fuel.	There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place, including paved surfaces and secondary containment. The release potential into the environment has not been assessed, due to the management of used oils in the area is considered a data gap; however, groundwater is captured based on Figures 15 and 18.	The South Terminal Used Oil Recovery Facility is retained for further evaluation.
SWMU 32: Hot Slab (or Mill) WWTP	Active	This unit is referred to as the Hot Strip Mill WWTP and receives and treats wastewater from the hot strip mill operations. The WWTP consists of three rapid mix tanks, six clarifiers, and four vacuum filters. The sludge generated by the WWTP is characterized as non-hazardous, based on laboratory analysis.	There are no documented releases, other than a one-time release of microbiocide in July 1992. As a result of that release, microbiocide is no longer used. The potential for a release to occur is very low because this unit has engineered controls in place, is continuously monitored by instrumentation and plant personnel, and wastes are stored in containers on paved surfaces. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 18.	The Hot Strip Mill WWTP is not a potentially significant source of contamination and is not retained for further evaluation.
SWMU 33: Spent Pickle Liquor Tank Farm	Active	This unit consists of three aboveground storage tanks that contain spent pickle liquor. Spent pickle liquor (K062) primarily contains hydrogen chloride and ferrous chloride. No releases occurred in the tank farm, but releases occurred in association with aboveground piping or piping in the injection wells (HWMU 1 and HWMU 2). During each release, the spills were contained, neutralized, and soils were removed for off-site disposal. The pipeline has been upgraded to minimize leaks and spills.	There are no documented releases from the storage tanks. The potential for a release to occur is very low because this unit has engineered controls in place and secondary containment for the storage tanks. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 18.	The Spent Pickle Liquor Tank Farm is not a potentially significant source of contamination and is not retained for further evaluation.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SOUTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 34: Spent Pickle Liquor Filtration System	Active	This unit includes a filtration system for the removal of solids from spent pickle liquor prior to deep well injection (HWMUs 1 and 2).	There are no documented releases. The potential for a release to occur is very low because this unit has engineered controls in place, the filtration system is in a building and is periodically checked by plant personnel. These controls would likely prevent a release from reaching soil and groundwater is captured based on Figures 15 and 18.	The Spent Pickle Liquor Filtration System is not a potentially significant source of contamination and is not retained for further evaluation.
HWMU 1: Easternmost Spent Pickle Liquor Injection Well (SWMU 35)	Active	This unit consists of a deep injection well (also known as Injection Well #2) used for the disposal of filtered spent pickle liquor. It is regulated by an Ohio EPA UIC permit.	In January 1998, approximately 150 gallons of SPL was released on the ground near the Injection Well. During the release, the spill was immediately contained in a drainage ditch, where free liquids were removed by a vacuum truck and the impacted soils were treated by mixing lime and soda ash (neutralization). After neutralization, the neutralized soils were removed for off-site disposal. The potential for a release to occur is very low because this unit has engineered controls in place and equipment inspections are conducted by plant personnel and Ohio EPA. In addition, a groundwater monitoring program is conducted at well USDW-01.These controls would likely prevent a shallow release from reaching soil prior to deep well injection.	The Easternmost Spent Pickle Liquor Injection Well is not a potentially significant source of contamination and is not retained for further evaluation.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SOUTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
HWMU 2: Westernmost Spent Pickle Liquor Injection Well (SWMU 36)	Active	This unit consists of a deep injection well (also known as Injection Well #1) used for the disposal of filtered spent pickle liquor. It is regulated by an Ohio EPA UIC permit.	In February 1993 and March 1998, approximately 3,800 and 200 gallons of SPL were released on the ground near the Injection Well, respectively. During each release, the spill was immediately contained in a drainage ditch, where free liquids were removed by a vacuum truck and the impacted soils were treated by mixing lime and soda ash (neutralization). After neutralization, the neutralized soils were removed for off-site disposal. The potential for a release to occur is very low because this unit has engineered controls in place and equipment inspections are conducted by plant personnel and Ohio EPA. In addition, a groundwater monitoring program is conducted at well USDW-01. These controls would likely prevent a shallow release from reaching soil prior to deep well injection. Therefore, groundwater is captured based on Figures 15 and 18.	The Westernmost Spent Pickle Liquor Injection Well is not a potentially significant source of contamination and is not retained for further evaluation
SWMU 37: Solid Waste Transfer Area	Inactive	This unit was used for temporary storage of accumulated solid wastes before disposal or recycling. Currently, the Transfer Area is used as a contractor staging area. The Transfer Area is surrounded by a fence with truck access and is not lined.	While there are no documented releases, spills and stains on soil were noted in 1991 during the PR/VSI. The release potential into the environment has not been assessed, due to the management of waste materials is considered a data gap; however, groundwater is captured based on Figures 15 and 18.	The former Solid Waste Transfer Area is retained for further evaluation in the RFI.
SWMU 50: Former Slag Processing Area	Inactive	This former unit managed slag in the mid 1950s to 1960s prior to construction of the Slag Processing Area in 1965. Currently this area is grass covered and undeveloped.	There are no documented releases. The release potential into the environment has not been assessed, due to the management of slag materials is considered a data gap; however, groundwater is captured based on Figures 15 and 17.	The Former Slag Processing Area is retained for further evaluation in the RFI.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SOUTH PLANT AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
AOC 22: Dredge Spoil Fill Area near corner of Jackson Lane and Lefferson Road	Inactive	This former unit was thought to be used as a fill area to contain dredged material removed during channelization of Dicks Creek; however, a review of aerial photographs indicated that this area was undisturbed during channelization. Currently this area is a paved employee parking lot and contains grass covered areas.	There are no documented releases and groundwater is captured based on Figures 15 and 18.	AOC 22 is not a potentially significant source of contamination and is not retained for further evaluation.
AOC 23: Dredge Spoil Fill Area near corner of Oxford State Road and North Branch of Dicks Creek	Inactive	This unit is known to contain fill material debris from construction of the Electrogalvanizing Plant. The use of this area associated with placement of dredge spoils from Dicks Creek was noted during review of aerial photographs. AOC 23 consists of several grass covered hills, a pond, and uncovered fill areas.	There are no documented releases. The potential for a release to occur is very low because of the materials placed in this area. The release potential into the environment has not been assessed, due to the management of suspected PCB impacted sediments/soils from Dicks Creek channelization is considered a data gap; however, groundwater is captured based on Figures 15 and 18.	AOC 23 is retained for further evaluation in the RFI.
AOC 24: Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from North Branch of Dicks Creek to Jackson Lane ditch (4000')	Inactive	This former unit was thought to be used as a fill area to contain dredged material removed during channelization of Dicks Creek; however, a review of aerial photographs indicated that this area was undisturbed during channelization. Currently this area is grass covered.	There are no documented releases and groundwater is captured based on Figure 15 and 18.	AOC 24 is not a potentially significant source of contamination and is not retained for further evaluation.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SLAG PROCESSING AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 38: Closed Solid Waste Landfill by Yankee Road and Dicks Creek	Inactive	This closed landfill consists of an unlined cell that covers approximately 14 acres. Wastes placed in the landfill included construction debris and residual wastes from steel-making operations.	There are no documented releases. The release potential will be assessed during the RFI. Groundwater is captured on the southwest side of the landfill based on Figures 15 and 19.	This landfill is retained for further evaluation in the RFI, as discussed in Exhibit D to Attachment 2: RFI/CMS SOW.
SWMU 39: Closed CERCLA Notification Solid Waste Landfill	Inactive	This closed landfill consists of an unlined cell that covers approximately 31 acres. Wastes placed in the landfill included construction debris, slag, tars, and steel-making sludge.	The release potential will be assessed during the RFI. Groundwater is captured on the west side of the landfill based on Figures 15 and 19.	This landfill is retained for further evaluation in the RFI, as discussed in Exhibit D to Attachment 2: RFI/CMS SOW.
SWMU 40: Closed Solid Waste Landfill on West Side of Slag Processing Area	Inactive	This closed landfill consists of an unlined cell that covers approximately 3 acres. Wastes placed in the landfill included slag, soils from new facility excavations, rubble, trash, tar materials, blast furnace dust, and WWTP sludges. Currently the landfill cover is inspected and mowed.	There are no documented releases. The potential for a release is high because the landfill is not lined. This area has been evaluated during previous investigations (ARCADIS, Inc. 2002a). Soil remediation at location BH-08 (IM 5) entailed delineation, excavation, and disposal of contaminated soils containing more than 25 mg/kg PCBs in the vicinity of AK Steel soil boring BH-08 and restoration of the excavated area. This historical soil boring is located at the northern edge of SWMU 40 (Closed Solid Waste Landfill on West Side of Slag Processing Area). The release potential into the environment has not been adequately assessed, due to the management of suspected PCB material in the landfill is considered a data gap, and groundwater is not captured based on Figures 15 and 19.	This landfill is retained for further evaluation in the RFI.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SLAG PROCESSING AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 41: Closed Solid Waste Landfill West of Slag Processing Area Access Road	Inactive	This closed landfill consists of two distinct unlined cells that cover approximately 14 acres. Wastes placed in the landfill included nonhazardous WWTP sludges. Currently the landfill cover is inspected and mowed.	There are no documented releases; however, there have been three seeps identified along this landfill adjacent to Dicks Creek (Seeps 7, 29, 35). AK Steel installed a phytoremediation barrier to control groundwater seeps emanating from the south bank of Dicks Creek as part of interim measures (IM 12). The potential for a release into the environment has not been assessed but is believed to be high because the landfill is not lined and is considered a data gap; however, groundwater is captured based on Figures 15 and 19.	This landfill is retained for further evaluation in the RFI.
SWMU 42: Closed Solid Waste Landfill East of Slag Processing Area Access Road	Inactive	This closed landfill consists of two unlined cells that cover approximately 20 acres. Wastes placed in the landfill included nonhazardous WWTP sludges and dust from several plant operations. Currently the landfill cover is inspected and mowed.	There are no documented releases. The potential for a release is high because the landfill is not lined; however, data from the site-wide groundwater monitoring program has not indicated a release has occurred from this landfill, and groundwater is captured based on Figures 15 and 19.	This landfill is not a potentially significant source of contamination and is not retained for further evaluation.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SLAG PROCESSING AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 43: Closed Solid Waste Landfill	Inactive	This closed landfill consists of an unlined cell that covers approximately 28 acres. Wastes placed in the landfill included nonhazardous WWTP sludges and dust from several plant operations. Landfill 1 (SWMU 43) is classified as a Class III residual waste landfill. Currently the landfill cover is inspected and mowed. AK Steel implements a groundwater monitoring program for this landfill.	The potential for a release is high because the landfill is not lined; however, there are no documented releases, and groundwater is captured based on Figures 15 and 19. This unit is regulated under the Ohio EPA solid waste program. A groundwater monitoring program is currently being implemented at this landfill and a statistical evaluation is conducted on a semi-annual basis by comparing upgradient versus downgradient wells.	This landfill is not retained for further evaluation based on the adequacy of data collected from the current groundwater monitoring program.
SWMU 46: Current Oil Storage Area	Active	This active SWMU consists of five aboveground storage tanks and several drums used to store oil. Approximately 10,000 pounds of oil and used oil is stored in the Oil Storage Area. The oil is used for lubricating mobile equipment.	Releases have occurred at the Current Oil Storage Area and no engineered controls are in place. The release potential into the environment has not been assessed, due to the management of oils in this area is considered a data gap. Groundwater is not captured based on Figures 15 and 19.	The Current Oil Storage Area is retained for further evaluation in the RFI.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SLAG PROCESSING AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
SWMU 47: Former Oil Separator Ponds and Vicinity	Inactive	This inactive unit consisted of three rectangular ponds, two small rectangular ponds and smaller circular ponds.	There were no documented releases from Former Oil Separator Ponds and there were no engineered controls in place. The Former Oil Separator Ponds and Vicinity have been characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). The release potential into the environment has not been adequately assessed; due to the management of PCB material in the ponds is considered a data gap, and groundwater is not captured based on Figures 15 and 19.	The Former Oil Separator Ponds and Vicinity is retained for further evaluation in the RFI.
SWMU 48: Existing Fueling Area in SW part of OMS	Active	This active SWMU consists of two aboveground storage tanks used to store fuel.	Releases have occurred at the Existing Fueling Area. Engineered controls are in place, including secondary containment. The release potential into the environment has not been assessed, due to the management of petroleum fuels in this area is considered a data gap, and groundwater is not captured based on Figures 15 and 19.	The Existing Fueling Area is retained for further evaluation in the RFI.
SWMU 49: Former Kish Quenching Area	Inactive	This inactive unit is used to quench kish pots prior to dumping to control air-borne emissions.	There are no documented releases from the Former Kish Quenching Area. The release potential into the environment has not been assessed, due to the management of PCB material during the former quenching activities is considered a data gap, and groundwater is not captured based on Figures 15 and 19.	The Former Kish Quenching Area is retained for further evaluation.

Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SLAG PROCESSING AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
AOC 11: Mill Scale Area 1	Active	This area is used to stockpile mill scale. Mill scale is an iron oxide scale that forms on the surface of steel when it is rolled. As mill scale forms, it is blown off with a high pressure wash. Oil is used as a lubricant during the rolling process and is commonly found on mill scale when it is dumped at the Slag Processing Area.	There are no documented releases and no engineered controls in place. Groundwater is not captured based on Figures 15 and 19.	AOC 11 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). This AOC is not retained for further evaluation in the RFI.
AOC 12: Mill Scale Area 2	Active	This area is used to stockpile mill scale. Mill scale is an iron oxide scale that forms on the surface of steel when it is rolled. As mill scale forms, it is blown off with a high pressure wash. Oil is used as a lubricant during the rolling process and is commonly found on mill scale when it is dumped at the Slag Processing Area.	There are no documented releases and no engineered controls in place. Groundwater is not captured based on Figures 15 and 19.	AOC 12 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). This AOC is not retained for further evaluation in the RFI.
AOC 13: Mill Scale Area 3	Active	This area is used to stockpile mill scale. Mill scale is an iron oxide scale that forms on the surface of steel when it is rolled. As mill scale forms, it is blown off with a high pressure wash. Oil is used as a lubricant during the rolling process and is commonly found on mill scale when it is dumped at the Slag Processing Area.	There are no documented releases and no engineered controls in place. Groundwater is not captured based on Figures 15 and 19.	AOC 13 has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). This AOC is not retained for further evaluation in the RFI.
AOC 14: Raw Slag Area	Active	This area is used to manage raw slag. Raw slag is composed predominantly of calcium silicate. AK Steel estimates 16 steel slag pots are delivered to the Raw Slag Area each day. Each pot contains approximately 25 tons of slag. The slag pots containing molten slag are dumped into one of four pits formed by solidified slag.	There are no documented releases and no engineered controls in place. Groundwater is not captured based on Figures 15 and 19.	The Raw Slag Area has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). This AOC is not retained for further evaluation in the RFI.
AOC 15: Finished Slag Area	Active	This active AOC is used to manage finished slag. Finished slag is composed predominantly of calcium silicate. Once slag is removed from the Raw Slag Area pits (AOC 14), it is placed in piles at the Finished Slag Area.	There are no documented releases and no engineered controls in place. Groundwater is not captured based on Figures 15 and 19.	The Finished Slag Area has been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). This AOC is not retained for further evaluation in the RFI.

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Table 1. Summary of SWMUs/HWMUs/AOCs/AAs, AK Steel Corporation, Middletown, Ohio.

SLAG PROCESSING AREA

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
AOC 16: 7 Oil Transformer Locations ("T" in OMS Area)	Inactive	This AOC consists of seven oil transformer locations in the Slag Processing Area. The transformers were PCB electric powered equipment.	There are no documented releases and no engineered controls in place. Groundwater is not captured, except one transformer location area near SWMU 49 based on Figures 15 and 19.	The 7 Oil Transformer Locations have been adequately characterized during previous investigations conducted at the Slag Processing Area (ARCADIS, Inc. 2002a). This AOC is not retained for further evaluation.

ADDITIONAL AREAS

Unit	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
AA02 – AA09	Inactive	These areas, AA02 through AA09 are designated areas where it is suggested that dredge spoils from the channelization of Dicks Creek were placed. These spoils may contain PCBs. All of the AA locations are off-site of the AK Steel property. AA01 is located in Dicks Creek Floodplain and will be addressed during interim measures.	There are no documented releases. The release potential into the environment has not been assessed; due to the management of PCB material in the sediments/soils during Dicks Creek channelization is considered a data gap. Based on Figure 15 and Figure 19 for the Additional Areas, groundwater is captured for all AAs located in this area with the possible exception of AA-07.	AA02 through AA09 are retained for further evaluation in the RFI.

Table 2. Aquatic Biological Community Indices for the Great Miami River (River Miles 49-52)

River Mile	Date	IBI	MIWB	ICI	QHEI	Source[a]	Description
52	1995	39	9.5	ND	78.5	OEPA	Downstream of Middletown Dam
	1998	44	10.1	ND	77.3	EA	
	1999	48	10.3	ND	77.3	EA	
	2000	42	9.6	44	67.8	EA	
51.5	1995	ND	ND	44	ND	OEPA	Downstream of Middletown Dam
	2000	50	10.35	42	76	OEPA	
51.4	1995	35	6.2	8	51	OEPA	AK Steel Outfall 011 mixing zone
	2000	40	7.45	4	ND[b]	OEPA	
51.3	1995	33	7.5	38	52.5	OEPA	Downstream of AK Steel Outfall 011, between combined sewer outfalls
	1998	38	9.4	ND	71.5	EA	
	1999	52	9.6	ND	73	EA	
	2000	45	8.6	36	73.5	OEPA	
	2000	48	8.7	38	63.3	EA	
51	1995	28	8.4	ND	60.5	OEPA	Upstream of Elk Creek
50.9	1995	ND	ND	38	ND	OEPA	Upstream of Elk Creek
	2000	50	9.45	48	76	OEPA	
49.3	1995	ND	ND	40	ND	OEPA	State Route 73
	2000	45	8.9	52	70.5	OEPA	
49.1	1995	35	7.8	ND	75.5	OEPA	Downstream of State Route 73
	1998	34	7.1	ND	51.3	EA	
Biological Criteria[c]		**42**	**8.5**	**36**	**(d)**		

EA - EA Engineering, Science, and Technology, Inc.
OEPA - Ohio Environmental Protection Agency
QHEI - Qualitative Habitat Evaluation Index
IBI - Index of Biotic Integrity
MIWB - Modified Index of Well-Being
ICI - Invertebrate Community Index
ND - no data

Notes:
a. OEPA fish scores are the average from two sampling events completed in specified year.
b. Outfall 011 mixing zone habitat not rated due to the short length of the sampling zone (Dennis Mishne, Ohio EPA, pers comm).
c. Eastern Corn Belt Plains Interior Plateau Biological Criteria (from OAC 3745-1-07, Table 7-14)
d. Scores above 60 indicate good habitat, while scores above 75 indicate excellent habitat.

Table 3. Common Animals (Terrestrial Vertebrates) Potentially Occurring in the Middletown Area

Scientific Name	Common Name	Habitat
Amphibians [a]		
Desmognathus fucus	Northern dusky salamander	Streams and ponds
Eurycea bislineata	Northern two-lined salamander	Streams
Plethodon cinerus	Eastern red-backed salamander	Woodland
Acris crepitans	Blanchard's cricket frog	Streams and ponds
Bufo americanus	Eastern American toad	Cosmopolitan (all habitats)
Bufo fowleri	Fowler's toad	Cosmopolitan (all habitats)
Hyla chrysocelis	Cope's gray treefrog	Woodland
Rana catesbeiana	American bullfrog	Streams and ponds
Rana clamitans	Northern green frog	Streams and ponds
Rana pipiens	Northern leopard frog	Streams and ponds
Reptiles [a]		
Chelydra serpentina	Common snapping turtle	Streams and ponds
Terrapene carolina	Eastern box turtle	Woodland
Eumeces fasciatus	Five-lined skink	Woodland
Coluber constrictor	Eastern yellow-bellied racer	Woodland and old field
Elaphe obsoleta	Black rat snake	Woodland, old field, and farmland
Nerodea sipedon	Northern water snake	Streams and ponds
Regina septemvittata	Queen snake	Streams and ponds
Thamnophis sirtalis	Common garter snake	Streams, ponds, and woodland
Birds [b]		
Branta canadensis	Canada goose	Ubiquitous, may become a nuisance locally.
Aix sponsa	Wood duck	Prefers wooded swamps, streams, backwaters.
Ana platychynchos	Mallard	Ubiquitous in marshes, lakes, flooded fields.
Ardea herodias	Great blue heron	Widespread colonial nester, near open water.
Butorides virescens	Green heron	Prefers streams, swamps, marshes.
Cathartes aura	Turkey vulture	Widespread migrant and nester.
Accipiter cooperii	Cooper's hawk	Widespread migrant and nester.
Buteo jamaicensis	Red-tailed hawk	Prefers upland woods and fields, roadsides.
Falco peregrinus	Peregrine falcon[c]	Introduced urban nesters may reside or migrate.
Falco sparverius	American kestrel	Prefers rural roadsides and fields.
Meleagris gallopavo	Wild turkey[c]	Prefers woodlands and edges.
Charadrius vociferus	Killdeer	Widespread, ubiquitous migrant and nester.
Actitis macularia	Spotted sandpiper	Prefers shorelines, mudflats, beaches.
Columba livia	Rock dove	Primarily found near human habitation.
Zenaida macroura	Mourning dove	Prefers areas of human habitation, farmlands.
Coccyzus americanus	Yellow-billed cuckoo	Prefers open woodlands, edges, thickets.
Chordeiles minor	Common nighthawk	Widespread urban flat-roof nester.
Chaetura pelagrica	Chimney swift	Widespread migrant and chimney nester.
Archilochus colubris	Ruby-throated hummingbird	Widespread migrant and nester.
Ceryle alcyon	Belted kingfisher	Widespread migrant and stream bank nester.
Melanerpes carolinus	Red-bellied woodpecker	Wooded residential areas, woodlands, riparian corridors.
Picoides pubescens	Downy woodpecker	Wooded residential areas, woodlands, riparian corridors.
Picoides villosus	Hairy woodpecker	Wooded residential areas, woodlands, riparian corridors.
Colaptes auratus	Northern flicker	Widespread migrant and nester.
Dryocopus pileatus	Pileated woodpecker	Prefers mature woods.
Contopus sorid idulus	Eastern wood-pewee	Prefers woodlands, woodlots, riparian corridors.
Empidonax virescens	Acadian flycatcher	Widespread nester.

Table 3. Common Animals (Terrestrial Vertebrates) Potentially Occurring in the Middletown Area

Scientific Name	Common Name	Habitat
Birds [b] ***cont.***		
Empidonax traillii	Willow flycatcher	Prefers wet/dry thickets, marshes.
Sayornis phoebe	Eastern phoebe	Widespread migrant and nester.
Myiarchus nuttingi	Great crested flycatcher	Prefers mature woods, parks, riparian corridors.
Tyrannus tyrannus	Eastern kingbird	Prefers woodland edges, countryside, riparian corridors.
Vireo griseus	White-eyed vireo	Prefers dense thickets.
Vireo flavifrons	Yellow-throated vireo	Widespread nester.
Vireo gilvus	Warbling vireo	Prefers tall cottonwoods near water, farmyards.
Vireo olivaceus	Red-eyed vireo	Prefers woodlands, woodlots, riparian corridors.
Cyanocitta cristata	Blue jay	Widespread permanent resident.
Corvus brachyrhynchos	American crow	Widespread permanent resident.
Eremophila alpestris	Horned lark	Prefers barren areas.
Tachycineta bicolor	Tree swallow	Widespread migrant and wetlands nester.
Stelgidopteryx serripennis	Northern rough-winged swallow	Widespread migrant and riparian burrow nester.
Riparia riparia	Bank swallow	Prefers riparian areas, quarries.
Hirundo rustica	Barn swallow	Prefers rural countryside near human habitation.
Parus carolinensis	Carolina chickadee	Widespread permanent resident in S 2/3 of state.
Baeolophus bicolor	Tufted titmouse	Prefers woodlands, residential areas, riparian corridors.
Sitta carolinensis	White-breasted nuthatch	Prefers woodlands, residential areas, riparian corridors.
Thryothorus ludovicianus	Carolina wren	Widespread permanent resident.
Troglodytes aedon	House wren	Prefers woodland edges, farmyards, residential areas.
Polioptila caerulea	Blue-gray gnatcatcher	Prefers woodlands, riparian corridors
Sialis sialis	Eastern bluebird	Prefers meadows, countryside.
Hylocichla mustelina	Wood thrush	Prefers woodlands, riparian corridors.
Turdus migratorius	American robin	Widespread, ubiquitous migrant and nester.
Dumetella carlinensis	Gray catbird	Prefers dense thickets, edges.
Mimus polyglottos	Northern mockingbird	Widespread resident in S 2/3 of state.
Toxostoma rufum	Brown thrasher	Prefers brush, overgrown fields.
Sturnus vulgaris	European starling	Widespread, ubiquitous, introduced resident and migrant.
Bombycilla cedrorum	Cedar waxwing	Widespread but irregular migrant and nester.
Vermivora pinus	Blue-winged warbler	Widespread migrant and nester.
Dendroica petechia	Yellow warbler	Prefers wet thickets.
Dendroica dominica	Yellow-throated warbler	Locally common sycamore nester in riparian areas.
Setophaga ruticilla	American redstart	Prefers young woods, edges.
Seiurus motacilla	Loisiania waterthrush	Prefers rocky streams.
Oporonis formosus	Kentucky warbler	Prefers mature woodlands.
Geothylpis trichas	Common yellowthroat	Prefers marshes, thickets.
Piranga rubra	Summer tanager	Widespread nester in south and unglaciated counties.
Piranga olivacea	Scarlet tanager	Prefers mature woodlands , riparian corridors.
Pipilo erythrophthalmus	Eastern towhee	Widespread migrant and thicket nester.
Spizella passerina	Chipping sparrow	Prefers conifers near human habitation.
Spizella pusilla	Field sparrow	Widespread migrant and thicket nester.
Melospiza melodia	Song sparrow	Prefers edges, thickets, weedy fields, yards.
Cardinalis cardinalis	Northern cardinal	Prefers thickets, edges, residential yards.
Pheucticus ludovicianus	Rose-breated grosbeak	Prefers woodland, riparian corridors.
Passerina cyanea	Indigo bunting	Prefers edges, brushy fields, roadsides.
Agelaius phoeniceus	Red-winged blackbird	Prefers marshes, fields, roadsides.
Sturnella magna	Eastern meadowlark	Widespread migrant and grassland nester.
Quiscalus quiscula	Common grackle	Widespread, ubiquitous migrant and nester.
Molothus ater	Brown-headed cowbird	Widespread migrant and nester.

Table 3. Common Animals (Terrestrial Vertebrates) Potentially Occurring in the Middletown Area

Scientific Name	Common Name	Habitat
Birds [b] ***cont.***		
Icterus spurius	Orchard oriole	Prefers farmlands, young woods, edges.
Icterus galbula	Baltimore oriole	Prefers shade trees, riparian corridors.
Carpodacus mexicanus	House finch	Prefers residential areas.
Passer domesticus	House sparrow	Ubiquitous, prefers areas of human habitation.
Mammals [d]		
Didelphis virginiana	Opossum	Along creeks and rivers to urban settings
Blarina brevicauda	Short-tailed shrew	Fields, woodlands, along streams, in man-made structures
Cryptotsis parva	Least shrew	Old fields
Scalopus aquaticus	Eastern mole	Beaches, woodlots, pastures and meadows
Myotis lucifugus	Little brown bat	Roost in hollow trees, man-made structures, caves
Eptesicus fuscus	Big brown bat	Roost in hollow trees, man-made structures, caves
Lasiurus borealis	Red bat	Among trees, bushes, or cluster of weeds
Sylvilagus floridanus	Eastern cottontail	Old fields to open woods
Tamias striatus	Eastern chipmunk	Deciduous woodland to urban and residential settings
Marmota monax	Woodchuck	Woodland edges bordering meadows, fields
Sciurus carolinensis	Eastern gray squirrel	Woodlots to urban and residential settings
Sciurus niger	Fox squirrel	Open deciduous woods
Gaucomys volans	Southern flying squirrel	Mature beech-maple forests
Castor canadensis	Beaver	Dens along banks of streams or lakes
Peromyscus maniculatus	Deer mouse	Grasslands
Peromyscus leucopus	White-footed mouse	Wooded areas
Microtus pennsylvanicus	Meadow vole	Open fields, occasionally deciduous forests
Microtus ochrogaster	Prairie vole	Dry upland fields to moist to wet areas
Ondantra zibenthicus	Muskrat	Rivers, lakes, streams, farm ponds, marshes, swamps
Zapus hudsonius	Meadow jumping mouse	Fields, margins of streams and wetlands, woodlands
Canis latrans	Coyote	Mixed farmland and woods, brushy areas
Vulpes vulpes	Red fox	Semi-cultivated fields with scattered deciduous woods
Procyon lotor	Raccoon	Woodlots to urban and residential settings
Mustela nivalis	Least weasel	Weedy fields to forests
Mustela renata	Long-tailed weasel	Woodlands, open fields, brush areas
Mustela vison	Mink	Vicinity of streams and lakes
Mephitis mephitis	Striped skunk	Widespread, especially rocky, brushy, semi-open areas
Odocoileus virginianus	White tail deer	Woodlots, forested, semi-forested brushy habitat

a. Amphibians and reptiles are included if identified by Ashton (1976) as common or very common in Preble County (immediately north of Butler County). Habitat information is from Ashton (1976).
b. Birds are included if identified by Keller (2006) as common or abundant in the Cincinnati area, and identified by the Ohio Bird Records Committee (OBRC, 2004) as nesting in relevant habitat. Habitat information is from OBRC (2004).
c. Included due to observations on-site.
d. Mammalian information is from Gottschang (1981); species are included if common.

Table 4: Preliminary Conceptual Site Model for Potential Human Exposures
AK Steel, Middletown, Ohio

<table>
<tr><th>Description and Location of Exposure Unit</th><th>Receptor Population</th><th>Exposure Medium</th><th>Exposure Route</th><th>Possible Currently?</th><th>Possible in Future?</th><th>Comments</th></tr>
<tr><td colspan="7">On-site Exposure Units</td></tr>
<tr><td rowspan="8">SWMUs 38 and 39

SWMUs 38 and 39 are located in western part of the Slag Processing Area, south of Dicks Creek. SWMU 38 is a closed, unlined solid waste landfill approximately 14 acres in size. The closed landfill is bordered by Dicks Creek to the north, Monroe Ditch to the south and west, and slag piles to the east. SWMU 39 is a closed, unlined solid waste landfill approximately 31 acres in size, bordered by Monroe Ditch to the north and east and railroad tracks to the south and west.</td><td rowspan="4">Maintenance Workers</td><td>surface and subsurface soil</td><td>incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in air</td><td>No</td><td>Yes</td><td rowspan="4">Future development of these units is not reasonably expected. Therefore exposure of residents or routine workers is not expected. No buildings are currently present in these areas and none are expected to be present in the future. SWMUs 38 and 39 are currently covered by a soil cap which will be maintained in the future.

The facility currently maintains a comprehensive health and safety plan which prevents unacceptable current worker exposures during maintenance activities in these areas from occurring. In the future, if such a health and safety plan is not maintained, potential exposure to cap soil would be possible during maintenance activities. Potential exposure to groundwater, leachate, waste or NAPL would also possible in excavations where these exposure media are encountered during maintenance.</td></tr>
<tr><td>groundwater and leachate</td><td>incidental ingestion of and dermal contact with exposed groundwater or leachate; inhalation of vapors from exposed groundwater or leachate in air</td><td>No</td><td>Yes</td></tr>
<tr><td>NAPL</td><td>dermal contact with exposed NAPL; inhalation of vapors from exposed NAPL in air</td><td>No</td><td>Yes</td></tr>
<tr><td>waste</td><td>dermal contact with exposed waste; inhalation of vapors from exposed waste in air</td><td>No</td><td>Yes</td></tr>
<tr><td rowspan="4">Trespassers</td><td rowspan="2">surface soil</td><td>incidental ingestion of and dermal contact with surface soil</td><td>No</td><td>Yes</td><td rowspan="4">SWMUs 38 and 39 are currently covered by a soil cap which will be maintained in the future. Currently, both SWMUs are fenced and a security officer is present 24 hours/day, 7 days a week so currently trespasser exposure is not expected. In the future, potential trespasser exposure to cap soil would be possible if security measures are not maintained. Trespasser exposure to soil-derived and groundwater derived vapors in ambient air would be possible.</td></tr>
<tr><td>inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air</td><td>No</td><td>Yes</td></tr>
<tr><td>subsurface soil</td><td>inhalation of soil-derived vapors in ambient air</td><td>No</td><td>Yes</td></tr>
<tr><td>groundwater</td><td>inhalation of groundwater-derived vapors in ambient air</td><td>Yes</td><td>Yes</td></tr>
<tr><td rowspan="4">Monroe Ditch

Monroe Ditch is a small tributary of Dicks Creek located within the Slag Processing Area. Drainage in the vicinity of the AK Steel facility and Slag Processing Area ultimately discharges into the Great Miami River through Dicks Creek.</td><td rowspan="2">Maintenance Workers</td><td>surface water</td><td>ingestion, dermal contact, and inhalation of vapors in ambient air</td><td>No</td><td>Yes</td><td rowspan="2">Workers may conduct occasional maintenance of the ditch. The facility currently maintains a comprehensive health and safety plan which prevents unacceptable current worker exposures during maintenance activities in this area from occurring. In the future, if such a health and safety plan is not maintained, exposure to surface water and sediment would be possible during these activities.</td></tr>
<tr><td>sediment</td><td>ingestion and dermal contact with surface water</td><td>No</td><td>Yes</td></tr>
<tr><td rowspan="2">Trespassers</td><td>surface water</td><td>ingestion, dermal contact, and inhalation of vapors in ambient air</td><td>Yes</td><td>Yes</td><td rowspan="2">Potential trespasser exposure to sediment and surface water in this area is possible.</td></tr>
<tr><td>sediment</td><td>ingestion and dermal contact with surface water</td><td>Yes</td><td>Yes</td></tr>
<tr><td rowspan="15">Melt Plant Area

SWMU 11 - Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds

SWMU 15 - Former Coal Tar Decanter Sludge (TDS) Recycling Area

SWMU 16 - Former Coal TDS Collection Bin

SWMU 17 - Northern Section of Former North Tar Lagoon (near Robin Hood Coal Pile)

SWMU 20 - Former Benzol Tank Farm Area

AOC 1 - Coke Quenching Water Collection Plant

AOC 2 - Tar Tanks

AOC 4 - Former Rail Car Transfer Area

AOC 6 - Stormwater Sump and Release Areas

AOC 21 - Dredge Soil Fill Area</td><td rowspan="9">Routine Workers</td><td rowspan="3">surface soil</td><td>incidental ingestion of and dermal contact with surface soil</td><td>Yes</td><td>Yes</td><td rowspan="9">Potential exposure of routine workers to surface soil is possible in uncovered (e.g., unpaved) areas. Potential indoor exposure is also possible if buildings are present or if buildings are constructed and occupied in the future and if soil-derived vapors migrate through building foundations.

Potable water is currently provided to the Facility by the City of Middletown via well fields 2 miles northwest of the Facility. The Facility pumps about 3-8 million gallons per day of groundwater from the lower aquifer for nonpotable manufacturing uses. Potential exposure of routine workers to groundwater vapors in ambient air is possible if the Site is redeveloped. Potential indoor exposure is possible if new buildings are constructed and occupied, if groundwater-derived vapors migrate through building foundations.</td></tr>
<tr><td>inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air</td><td>Yes</td><td>Yes</td></tr>
<tr><td>inhalation of soil-derived vapors that migrate through building foundations into indoor air</td><td>Yes</td><td>Yes</td></tr>
<tr><td rowspan="2">subsurface soil</td><td>inhalation of soil-derived vapors in ambient air</td><td>Yes</td><td>Yes</td></tr>
<tr><td>inhalation of soil-derived vapors that migrate through building foundations into indoor air</td><td>Yes</td><td>Yes</td></tr>
<tr><td rowspan="4">groundwater</td><td>ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water</td><td>No</td><td>Yes</td></tr>
<tr><td>incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water</td><td>Yes</td><td>Yes</td></tr>
<tr><td>inhalation of groundwater-derived vapors in ambient air</td><td>Yes</td><td>Yes</td></tr>
<tr><td>inhalation of groundwater-derived vapors that migrate through building foundations into indoor air</td><td>Yes</td><td>Yes</td></tr>
<tr><td rowspan="2">Maintenance Workers</td><td>surface and subsurface soil</td><td>incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air</td><td>No</td><td>Yes</td><td rowspan="2">The Facility currently maintains an institutional control in the form of a comprehensive worker health and safety plan (HASP) which addresses current worker exposure safety and health. If the HASP were not maintained in the future, exposure to soil and shallow groundwater would be possible during excavations or during maintenance activities where these exposure media are encountered.</td></tr>
<tr><td>groundwater</td><td>incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air</td><td>No</td><td>Yes</td></tr>
<tr><td rowspan="4">Trespassers</td><td rowspan="2">surface soil</td><td>incidental ingestion of and dermal contact with surface soil</td><td>Yes</td><td>Yes</td><td rowspan="4">Exposures to surface soil may be possible at areas without cover or where cover is planned to be removed in the future. Trespasser activities do not involve direct contact with subsurface soil. Trespasser exposure to soil-derived and groundwater-derived vapors in ambient air would be possible.</td></tr>
<tr><td>inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air</td><td>Yes</td><td>Yes</td></tr>
<tr><td>subsurface soil</td><td>inhalation of soil-derived vapors in ambient air</td><td>Yes</td><td>Yes</td></tr>
<tr><td>groundwater</td><td>inhalation of groundwater-derived vapors in ambient air</td><td>Yes</td><td>Yes</td></tr>
</table>

Table 4: Preliminary Conceptual Site Model for Potential Human Exposures
AK Steel, Middletown, Ohio

Description and Location of Exposure Unit	Receptor Population	Exposure Medium	Exposure Route	Possible Currently?	Possible in Future?	Comments
On-site Exposure Units (cont.)						
Slag Processing Area SWMU 40 - Closed Solid Waste Landfill on West Side of Slag Processing Area SWMU 41 - Closed Solid Waste Landfill West of Slag Processing Area Access Road SWMU 46 - Current Oil Storage Area (Slag Processing Area) SWMU 47 - Former Oil Separator Ponds and Vicinity SWMU 48 - Existing Fueling Area in SW part of Slag Processing Area SWMU 49 - Former Kish Quenching Area	Routine Workers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Potential exposure of routine workers to surface soil is possible in uncovered (e.g., unpaved) areas. Potential indoor exposure is also possible if buildings are present or if buildings are constructed and occupied in the future and if soil-derived vapors migrate through building foundations. Currently routine workers are only present SWMU 47 but future workers may be exposed to onsite soil in other the SWMUs if these portions of the exposure unit were to be redeveloped for commercial/industrial purposes. If redevelopment occurs, potential exposure of routine workers to surface soil is possible in uncovered (e.g., unpaved) areas. Potential indoor exposure is also possible if new buildings are constructed and occupied and if soil-derived vapors migrate through building foundations. SWMUs 40 and 41 are not expected to be redeveloped in the future as they are closed solid waste landfills.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	Yes	
			incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	Yes	Yes	Potable water is currently provided to the Facility by the City of Middletown via well fields 2 miles northwest of the Facility. The Facility pumps about 3-8 million gallons per day of groundwater from the lower aquifer for nonpotable manufacturing uses. Potential exposure of routine workers to groundwater vapors in ambient air is possible if the Site is redeveloped. Potential indoor exposure is possible if new buildings are constructed and occupied, if groundwater-derived vapors migrate through building foundations.
			inhalation of groundwater-derived vapors in ambient air	Yes	Yes	
			inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
	Maintenance Workers	surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air	No	Yes	The Facility currently maintains an institutional control in the form of a comprehensive worker health and safety plan (HASP) which addresses current worker exposure safety and health. If the HASP were not maintained in the future, exposure to soil, shallow groundwater, leachate, waste, sediment and surface water would be possible during excavations or during maintenance activities where these exposure media are encountered.
		groundwater and leachate	incidental ingestion of and dermal contact with exposed groundwater or leachate; inhalation of vapors from exposed groundwater or leachate in air	No	Yes	
		waste	dermal contact with exposed waste; inhalation of vapors from exposed waste in air	No	Yes	
		sediment	incidental ingestion of and dermal contact with sediment	No	Yes	
		surface water	incidental ingestion of and dermal contact with surface water; inhalation of vapor from surface water in work-space air	No	Yes	
	Trespassers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Exposures to surface soil may be possible at areas without cover or where cover is planned to be removed in the future. Trespasser activities do not involve direct contact with subsurface soil. Trespasser exposure to soil-derived and groundwater-derived vapors in ambient air would be possible. Potential exposures to sediment and surface water in storm water drainage and process ponds is possible.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
		groundwater	inhalation of groundwater-derived vapors in ambient air	Yes	Yes	
		sediment	incidental ingestion of and dermal contact with sediment	Yes	Yes	
		surface water	incidental ingestion of and dermal contact with surface water; inhalation of vapor from surface water in air	Yes	Yes	

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AK Steel, Middletown, Ohio

Description and Location of Exposure Unit	Receptor Population	Exposure Medium	Exposure Route	Possible Currently?	Possible in Future?	Comments
On-site Exposure Units (cont.)						
North Plant Area SWMU 2 - North Terminal WWTP Concentrator Pit SWMU 3 - Terne Coat Flux Hazardous Waste Storage Area SWMU 4 - Terne Coat Dross Bucket Storage Area, TCE Plume (GM-27S) SWMU 6 - PCB Storage Area SWMU 7 - Former Used Oil Reclamation Facility SWMU 8 - Used Oil Reclamation Facility Number 2 SWMU 9 - Former Used Oil Reclamation Facility Number 3	Routine Workers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Potential exposure of routine workers to surface soil is possible in uncovered (e.g., unpaved) areas. Potential indoor exposure is also possible if buildings are present or if buildings are constructed and occupied in the future and if soil-derived vapors migrate through building foundations. Potable water is currently provided to the Facility by the City of Middletown via well fields 2 miles northwest of the Facility. The Facility pumps about 3-8 million gallons per day of groundwater from the lower aquifer for nonpotable manufacturing uses. Potential exposure of routine workers to groundwater vapors in ambient air is possible if the Site is redeveloped. Potential indoor exposure is possible if new buildings are constructed and occupied, if groundwater-derived vapors migrate through building foundations.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	Yes	
			incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	Yes	Yes	
			inhalation of groundwater-derived vapors in ambient air	Yes	Yes	
			inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
	Maintenance Workers	surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air	No	Yes	The Facility currently maintains an institutional control in the form of a comprehensive worker health and safety plan (HASP) which addresses current worker exposure safety and health. If the HASP were not maintained in the future, exposure to soil and shallow groundwater would be possible during excavations or during maintenance activities where these exposure media are encountered.
		groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	Yes	
	Trespassers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Exposures to surface soil may be possible at areas without cover or where cover is planned to be removed in the future. Trespasser activities do not involve direct contact with subsurface soil. Trespasser exposure to soil-derived and groundwater-derived vapors in ambient air would be possible.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
		groundwater	inhalation of groundwater-derived vapors in ambient air	Yes	Yes	
South Plant Area SWMU 31 - South Terminal Used Oil Recovery Facility SWMU 37 - Solid Waste Transfer Area SWMU 50 - Former Slag Processing Area AOC 23 - Dredge Soil Fill Area	Routine Workers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Potential exposure of routine workers to surface soil is possible in uncovered (e.g., unpaved) areas. Potential indoor exposure is also possible if buildings are present or if buildings are constructed and occupied in the future and if soil-derived vapors migrate through building foundations. Potable water is currently provided to the Facility by the City of Middletown via well fields 2 miles northwest of the Facility. The Facility pumps about 3-8 million gallons per day of groundwater from the lower aquifer for nonpotable manufacturing uses. Potential exposure of routine workers to groundwater vapors in ambient air is possible if the Site is redeveloped. Potential indoor exposure is possible if new buildings are constructed and occupied, if groundwater-derived vapors migrate through building foundations.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	Yes	
			incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	Yes	Yes	
			inhalation of groundwater-derived vapors in ambient air	Yes	Yes	
			inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
	Maintenance Workers	surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air	No	Yes	The Facility currently maintains an institutional control in the form of a comprehensive worker health and safety plan (HASP) which addresses current worker exposure safety and health. If the HASP were not maintained in the future, exposure to soil and shallow groundwater would be possible during excavations or during maintenance activities where these exposure media are encountered.
		groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	Yes	
	Trespassers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Exposures to surface soil may be possible at areas without cover or where cover is planned to be removed in the future. Trespasser activities do not involve direct contact with subsurface soil. Trespasser exposure to soil-derived and groundwater-derived vapors in ambient air would be possible.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
		groundwater	inhalation of groundwater-derived vapors in ambient air	Yes	Yes	

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Description and Location of Exposure Unit	Receptor Population	Exposure Medium	Exposure Route	Possible Currently?	Possible in Future?	Comments
On-site Exposure Units (cont.)						
Miscellaneous Areas SWMU 23 - Coil Paint Lagoons TCE Plume	Routine Workers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Potential exposure of routine workers to surface soil is possible in uncovered (e.g., unpaved) areas. Potential indoor exposure is also possible if buildings are present or if buildings are constructed and occupied in the future and if soil-derived vapors migrate through building foundations. Potable water is currently provided to the Facility by the City of Middletown via well fields 2 miles northwest of the Facility. The Facility pumps about 3-8 million gallons per day of groundwater from the lower aquifer for nonpotable manufacturing uses. Potential exposure of routine workers to groundwater vapors in ambient air is possible if the Site is redeveloped. Potential indoor exposure is possible if new buildings are constructed and occupied, if groundwater-derived vapors migrate through building foundations.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	Yes	
			incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	Yes	Yes	
			inhalation of groundwater-derived vapors in ambient air	Yes	Yes	
			inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
	Maintenance Workers	surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air	No	Yes	The Facility currently maintains an institutional control in the form of a comprehensive worker health and safety plan (HASP) which addresses current worker exposure safety and health. If the HASP were not maintained in the future, exposure to soil and shallow groundwater would be possible during excavations or during maintenance activities where these exposure media are encountered.
		groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	Yes	
	Trespassers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Exposures to surface soil may be possible at areas without cover or where cover is planned to be removed in the future. Trespasser activities do not involve direct contact with subsurface soil. Trespasser exposure to soil-derived and groundwater-derived vapors in ambient air would be possible.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
		groundwater	inhalation of groundwater-derived vapors in ambient air	Yes	Yes	

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AK Steel, Middletown, Ohio

Description and Location of Exposure Unit	Receptor Population	Exposure Medium	Exposure Route	Possible Currently?	Possible in Future?	Comments
Off-site Exposure Units						
Additional Areas AA02 - Former Glenn Cartage Property AA03 - Thomas Sturgell Property AA04 - Back Half of Properties between Glenn Cartage and Sturgell Properties AA05 - Old Armco Lot NS DC, North of Big Meander AA06 - Former Burridge Machine Shop Property, NS DC AA07- Former Cecil Osburn Lot (Stations 12-18) AA08 - Pipeline Fill Area (Stations 32-36) AA09 - Orman's Welding Property	Routine Workers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Historical deposition of dredge spoils in limited off-site areas may have occurred such that facility-related impacts may exist in off-site soil. Routine workers may also be exposed to vapors and particulates migrating and dispersing off-site from on-site soil. Off-site groundwater impacts have not been identified in these areas. Potable water is currently provided to these areas by the City of Middletown via well fields 2 miles northwest of the facility. A number of off-site wells have been identified but specifics regarding their current use is not yet available. Exposures to groundwater via nonpotable industrial groundwater uses may be possible if off-site wells identified are used for nonpotable purposes and if off-site groundwater were to become impacted by the site in the future. Exposure via vapor intrusion through cracks in building foundations into indoor air may be possible in areas where buildings are present in the future and where site-related volatile constituents are present. Finally, potential exposure to groundwater vapors in ambient air would be possible in the future if on-site groundwater contamination were to migrate off-site.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	Yes	
			incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	No	Yes	
			inhalation of groundwater-derived vapors in ambient air	No	Yes	
			inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	No	Yes	
	Maintenance Workers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Historical deposition of dredge spoils in limited off-site areas may have occurred such that facility-related impacts may exist in off-site soil. Off-site groundwater impacts have not been identified in these areas. Maintenance workers may be exposed to soil and during excavations for utility maintenance. Exposure to shallow groundwater would be possible if on-site groundwater contamination were to migrate to these areas in the future and during excavations or during maintenance activities where these exposure media are encountered.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		subsurface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	Yes	
	Residents	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Historical deposition of dredge spoils in limited off-site areas may have occurred such that facility-related impacts may exist in off-site soil. Residents may also be exposed to vapors and particulates migrating and dispersing off-site from on-site soil. Off-site gw impacts have not been identified in these areas. Potable water is currently provided to these areas by the City of Middletown via well fields 2 miles northwest of the facility. A number of off-site wells have been identified but specifics regarding their current use is not yet available. Exposures to groundwater via nonpotable groundwater uses may be possible if off-site wells identified are used for nonpotable purposes and if off-site groundwater were to become impacted by the site in the future. Exposure via vapor intrusion through cracks in building foundations into indoor air may be possible in areas where buildings are present in the future and where site-related volatile constituents are present. Finally, potential exposure to groundwater vapors in ambient air would be possible in the future if on-site groundwater contamination were to migrate off-site.
			inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		subsurface soil	inhalation of soil-derived vapors in ambient air	Yes	Yes	
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	Yes	
			incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	No	Yes	
			inhalation of groundwater-derived vapors in ambient air	No	Yes	
			inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	No	Yes	

Table 4: Preliminary Conceptual Site Model for Potential Human Exposures
AK Steel, Middletown, Ohio

Description and Location of Exposure Unit	Receptor Population	Exposure Medium	Exposure Route	Possible Currently?	Possible in Future?	Comments
Off-site Exposure Units (cont.)						
Dicks Creek Dicks Creek runs along the northern boundary, approximately 100 feet north of the Slag Processing Area, and approximately 3 to 4 river miles east of the Great Miami River. Monroe Ditch is a small tributary of Dicks Creek located within the Slag Processing Area. Drainage in the vicinity of the AK Steel facility and Slag Processing Area ultimately discharges into the Great Miami River through Dicks Creek.	Recreational Users	surface water	ingestion, dermal contact with surface water, and inhalation of vapors in ambient air	Yes	Yes	Potential recreational user exposure to floodplain soil, sediment, and surface water in this area is possible. Children, adolescents, and/or adults may visit this exposure unit to walk, picnic, or play along the banks and/or flood plain and/or wade in the unit. Ohio EPA has published a "DO NOT EAT" fish advisory for Dicks Creek. As such, exposure to fish caught in this unit via ingestion is currently not expected. In the future, consumption of fish caught from the unit through occasional fishing may be possible.
		sediment	ingestion and dermal contact with sediment	Yes	Yes	
		surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in air	Yes	Yes	
		fish	ingestion of fish	Yes	Yes	
Great Miami River (RM 49-52) Drainage in the vicinity of the AK Steel facility and Slag Processing Area ultimately discharges into the Great Miami River through Dicks Creek. Most of the North Plant Area drains directly to the Great Miami River through Outfall 011, between river miles 52.0 and 49.0.	Recreational Users	surface water	ingestion, dermal contact with surface water, and inhalation of vapors in ambient air	Yes	Yes	Potential recreational user exposure to sediment, surface water and fish in this area is possible. Children, adolescents, and/or adults may visit this exposure unit to walk, picnic, or play along the banks and/or flood plain and/or wade in the unit. Ohio EPA has published a limited "DO NOT EAT" fish advisory for the Great Miami River recommending that only some fish species ("ALL SUCKERS") not be consumed and recommending that other species of fish only be consumed on a limited basis. Despite the fact that fishing activity in this unit is expected to be limited the consumption of fish caught from the unit through occasional fishing is possible.
		sediment	ingestion and dermal contact with sediment	Yes	Yes	
		fish	ingestion of fish	Yes	Yes	

Table 4: Preliminary Conceptual Site Model for Potential Human Exposures
AK Steel, Middletown, Ohio

Description and Location of Exposure Unit	Receptor Population	Exposure Medium	Exposure Route	Possible Currently?	Possible in Future?	Comments
Off-site Exposure Units (cont.)						
Other Off-site Areas (Areas of potential future contaminated groundwater migration or migration of soil airborne particulates or vapors)	Routine Workers	on-site surface and subsurface soil	inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	Routine workers, maintenance workers, and residents may be exposed to vapors and particulates migrating and dispersing off-site from on-site soil. Off-site groundwater impacts have not been identified in these areas. Potable water is currently provided to these areas by the City of Middletown via well fields 2 miles northwest of the facility. A number of off-site wells have been identified but specifics regarding their current use is not yet available. Exposures to groundwater via nonpotable industrial groundwater uses may be possible if off-site wells identified are used for nonpotable purposes and if off-site groundwater were to become impacted by the site in the future. Exposure via vapor intrusion through cracks in building foundations into indoor air may be possible in areas where buildings are present in the future and where site-related volatile constituents are present. Finally, potential exposure to groundwater vapors in ambient air would be possible in the future if on-site groundwater contamination were to migrate off-site.
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	Yes	
			incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	No	Yes	
			inhalation of groundwater-derived vapors in ambient air	No	Yes	
			inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	No	Yes	
	Maintenance Workers	on-site surface and subsurface soil	inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	Historical deposition of dredge spoils in limited off-site select areas may have occurred such that facility-related impacts may exist in off-site soil. Off-site groundwater impacts have not been identified in these areas. Maintenance workers may be exposed to soil and during excavations for utility maintenance. Exposure to shallow groundwater would be possible if on-site groundwater contamination were to migrate to these areas in the future and during excavations or during maintenance activities where these exposure media are encountered.
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	Yes	
	Residents	on-site surface and subsurface soil	inhalation of soil-derived vapors and airborne particulates (wind erosion) in ambient air	Yes	Yes	Historical deposition of dredge spoils in limited off-site areas may have occurred such that facility-related impacts may exist in off-site soil. Residents may also be exposed to vapors and particulates migrating and dispersing off-site from on-site soil. Off-site groundwater impacts have not been identified in these areas. Potable water is currently provided to these areas by the City of Middletown via well fields 2 miles northwest of the facility. A number of off-site wells have been identified but specifics regarding their current use is not yet available. Exposures to groundwater via nonpotable groundwater uses may be possible if off-site wells identified are used for nonpotable purposes and if off-site groundwater were to become impacted by the site in the future. Exposure via vapor intrusion through cracks in building foundations into indoor air may be possible in areas where buildings are present in the future and where site-related volatile constituents are present.
			inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	
		groundwater	ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	No	
			incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	No	Yes	
			inhalation of groundwater-derived vapors in ambient air	No	Yes	
			inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	No	Yes	

Table 5. Great Miami River Surface Water Screening Comparisons

Analyte	Maximum Detected Concentration		Human Health Screening Value	Ecological Screening Value			Exceedance	
	Upstream Outfall 011[a] (µg/L)	Downstream Outfall 011[b] (µg/L)	OEPA Nondrink WQC (ug/L)	USEPA Region 5 ESL (ug/L)	OEPA Aquatic Life OMZA (µg/L)	Other Value (µg/L)	Upstream Outfall 011	Downstream Outfall 011
Aldrin	ND	0.005	0.0014	0.017	NC	NA	no	yes
alpha-Hexachlorocyclohexane	ND	0.01	0.13	12.4	NC	NA	no	no
Aluminum	2980	3030	NC	NC	NC	87[c]	yes	yes
Ammonia	ND	3260	NC	NC	400[d]	NA	no	yes
Arsenic	2	4	NC	148	150	NA	no	no
Barium	103	103	NC	220	220	NA	no	no
beta-Hexachlorocyclohexane	ND	0.004	0.46	0.495	NC	NA	no	no
Chloride	96000	141000	NC	NC	NC	230000[c]	yes	yes
Copper	10	ND	1300	1.58	24.7[e]	NA	yes	no
Cyanide, Total	ND	0.013	220000	5.2	12	NA	no	no
delta-Hexachlorocyclohexane	ND	0.007	NC	667	NC	NA	no	no
Dieldrin	ND	0.009	0.0014	0.000071	0.056	NA	no	yes
Endrin	ND	0.007	0.81	0.036	0.036	NA	no	no
gamma-Hexachlorocyclohexane	ND	0.007	0.63	0.026	0.057	NA	no	no
Hexachlorobenzene	ND	0.003	0.0077	0.0003	NC	NA	no	yes
Iron	4380	4440	NC	NC	NC	1000[c]	yes	yes
Lead	5	19	NC	1.17	27.3[e]	NA	yes	yes
Manganese	85	111	NC	NC	NC	5243[e,f]	no	no
Oil & Grease	ND	7110	NC	NC	10000[g]	NA	no	no
pH - alkaline	8.56	9.28	NC	NC	9	NA	no	yes
pH - acidic	7.95	7.91	NC	NC	6.5	NA	no	no
Selenium	ND	3	11000	5	5	NA	no	no
Strontium	1030	1010	NC	NC	21000	NA	no	no
Total Kjeldahl Nitrogen	1140	4290	NC	NC	NC	2180[g]	no	yes
Total Dissolved Solids	528000	622000	NC	NC	1500000	NA	no	no
Total Phosphorus	460	480	NC	NC	NC	76.25[g]	yes	yes
Zinc	53	63	69000	65.7	314[e]	NA	no	no

ESL: ecological screening level
NA: not applicable; supplemental screening value sources used only if no values available from primary sources.
NC: no criterion
ND: not detected
OEPA: Ohio Environmental Protection Agency
OMZA: outside mixing zone average
µg/L: micrograms per liter
USEPA: U.S. Environmental Protection Agency
WQC: water quality criteria

Notes:
a. Samples taken at river mile 51.5.
b. Samples taken at river miles 51.3 and 49.27.
c. Criteria are freshwater, chronic USEPA National Recommended Water Quality Criteria.
d. Value calculated based on average pH of 8.4 and average water temperature of 24°C.
e. Value calculated based on average hardness of 312 mg/L.
f. Criteria from Michigan Department of Environmental Quality Rule 57 Water Quality Values, 2009.
g. Criteria are USEPA Ecoregion Nutrient Criteria, available at: http://www.epa.gov/waterscience/criteria/nutrient/ecoregions/.

Table 6. Great Miami River Sediment Screening Comparisons

Analyte	Detected		Ecological Screening Value		Exceedance	
	Upstream[a] (mg/kg)	Downstream[b] (mg/kg)	Region 5 ESL (mg/kg)	OEPA SRV (mg/kg)	Upstream	Downstream
2-Methylnaphthalene	ND	7.6	0.02	NC	no	yes
Acenaphthene	ND	10.7	0.00671	NC	no	yes
Acenaphthylene	ND	6.1	0.00587	NC	no	yes
alpha-BHC	ND	0.026	0.006	NC	no	yes
Aluminum	13000	17000	NC	39000	no	no
Anthracene	ND	31	0.0572	NC	no	yes
Arsenic	7.92	41.4	9.79	18	no	yes
Barium	94.2	285	NC	240	no	yes
Benzo [A] Anthracene	ND	35.8	0.108	NC	no	yes
Benzo [A] Pyrene	ND	19.8	0.15	NC	no	yes
Benzo [B&K] Fluoranthene	ND	37.7	0.24	NC	no	yes
Benzo [GHI] Perylene	ND	19.1	0.17	NC	no	yes
Cadmium	0.411	5.41	0.99	0.9	no	yes
Chromium	19.3	93.7	43.4	40	no	yes
Chrysene	ND	20	0.166	NC	no	yes
Copper	15	613	31.6	34	no	yes
Dibenzo [A,H] Anthracene	ND	9.5	0.033	NC	no	yes
Dibenzofuran	ND	8.2	0.449	NC	no	yes
Dieldrin	0.0094	ND	0.0019	NC	yes	no
Fluoranthene	0.6	83.2	0.423	NC	yes	yes
Fluorene	ND	31.4	0.0774	NC	no	yes
Indeno [1,2,3-CD] Pyrene	ND	19.1	0.2	NC	no	yes
Iron	13000	207000	NC	33000	no	yes
Lead	20.3	213	35.8	47	no	yes
Magnesium	30900	14300	NC	35000	no	no
Manganese	319	393	NC	780	no	no
Mercury	0.0578	1.15	0.174	0.12	no	yes
Naphthalene	ND	4	0.176	NC	no	yes
Nickel	ND	69.3	22.7	42	no	yes
Phenanthrene	ND	63.8	0.204	NC	no	yes
Potassium	3380	ND	NC	11000	no	no
Pyrene	ND	64	0.195	NC	no	yes
Selenium	1.35	2.41	NC	2.3	no	yes
Zinc	74.9	1240	121	160	no	yes

ESL: ecological screening level
mg/kg: milligram per kilogram
NC: no criterion
ND: not detected
OEPA: Ohio Environmental Protection Agency
SRV: sediment reference value
USEPA: U.S. Environmental Protection Agency

Notes:
a. Sample taken at rivermile 52.64.
b. Sample taken at rivermile 51.3.

Table 7. Great Miami River Fish Tissue Screening Comparisons

	Maximum Detected Concentration		Screening Value			Exceedance	
Analyte	Upstream Outfall 011[a] (mg/kg, fillet)	Downstream[b] (mg/kg, fillet)	Upper Limit for Unrestricted Human Consumption[c] (mg/kg)	Ecological Benchmark (mg/kg)	Ecological Benchmark Source	Upstream Outfall 011 (fillet)	Downstream Outfall 011 (fillet)
Total Chlordane	0.1018	0.08246	0.5	0.5	NYS DEC Noncancer Criterion for Piscivorous Wildlife	no	no
Total DDT	0.0471	0.04224	0.5	0.1[d]	Derived from USEPA (1995) Great Lakes WQC for Piscivorous Wildlife	no	no
Dieldrin	ND	0.0236	0.05	0.12	NYS DEC Noncancer Criterion for Piscivorous Wildlife	no	no
Mercury	0.266	0.335	0.05	0.2[e]	Derived from USEPA (1995) Great Lakes WQC for Piscivorous Wildlife	yes	yes
Total PCBs	0.851	0.876	0.05	0.46[f]	Derived from USEPA (1995) Great Lakes WQC for Piscivorous Wildlife	yes	yes
Selenium	0.382	0.464	2.5	1.582[g]	USEPA (2004) Draft Aquatic Life WQC for Selenium	no	no

BAF: bioaccumulation factor
mg/kg: milligram per kilogram
NC: no criterion
ND: not detected
NYS DEC: New York State Department of Environmental Conservation
USEPA: U.S. Environmental Protection Agency
WQC: water quality criteria

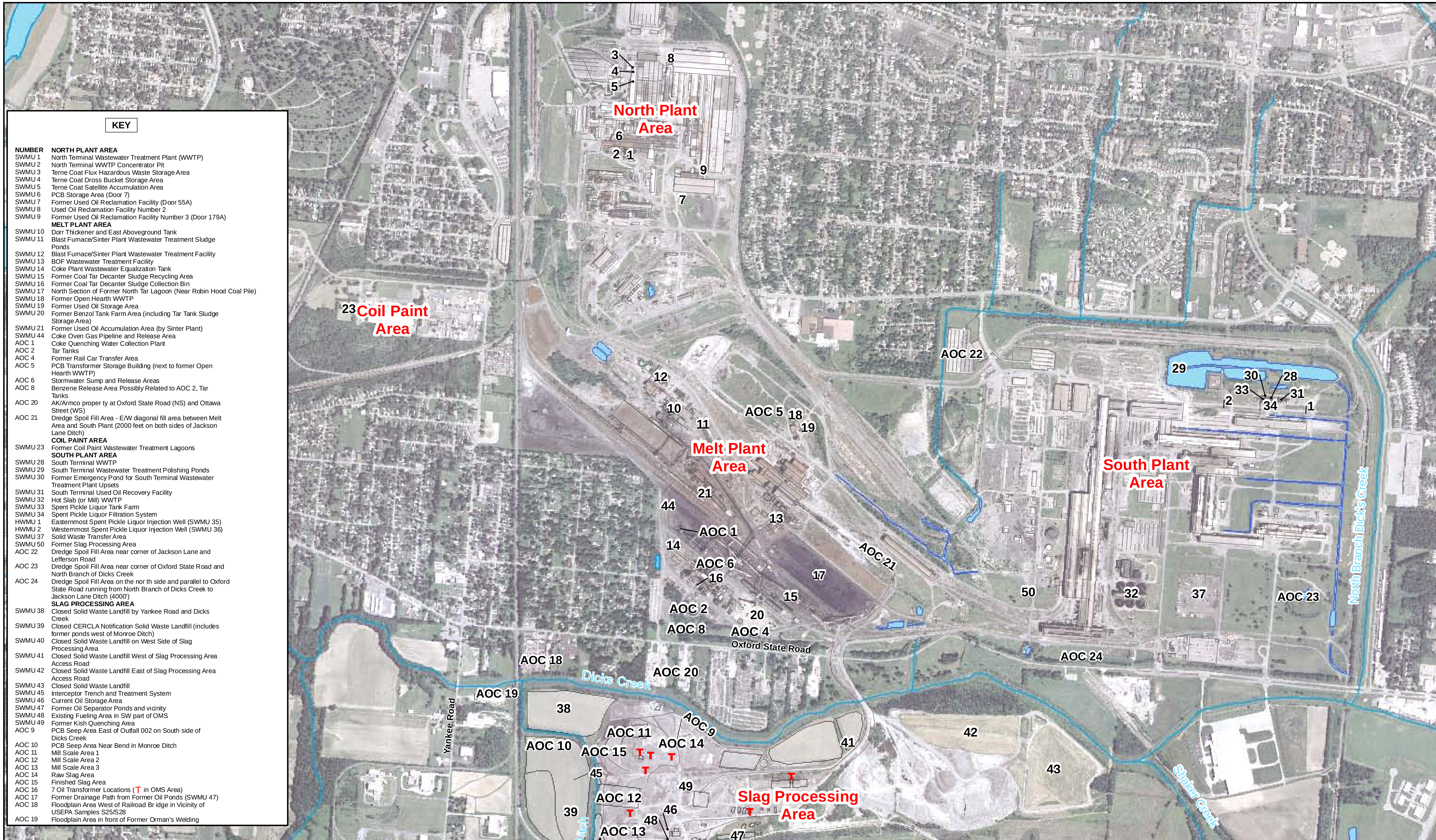
Notes:
a. Sample taken at river mile 59.3.
b. Samples taken at river mile 50.7.
c. State of Ohio Cooperative Fish Tissue Monitoring Program Sport Fish Tissue Consumption Advisory Program, May 2008.
d. Multiplication of the WQC (11 pg/L) by the BAF used to derive this criterion (9,357,000 L/kg) yields a fish tissue concentration of 0.1 mg/kg.
e. Multiplication of the WQC (1.3 ng/L) by the BAF used to derive this criterion (140,000 L/kg) yields a fish tissue concentration of 0.2 mg/kg.
f. Multiplication of the WQC (74 pg/L) by the BAF used to derive this criterion (6,224,000 L/kg) yields a fish tissue concentration of 0.46 mg/kg.
g. Criterion is converted from dry weight to wet weight.

Table 8. Acute Toxicity Test Results for Outfall 011 Effluent and Great Miami River Receiving Water

	Outfall 011 Effluent		Upstream Great Miami River[a]
Date	Acute Toxicity, *Ceriodaphnia dubia* (TUa)[b]	Acute Toxicity, *Pimephales promelas* (TUa)	Acute Toxicity, *Pimephales promelas* (% Affected)
AK Steel Effluent Monitoring			
Mar-05	NT	1.4	<10
Apr-05	NT	<0.2	NT
Jun-05	NT	<0.2	<10
Aug-05	NT	<0.2	<10
Dec-05	NT	<0.2	<10
Mar-06	NT	<0.2	<10
Jun-06	NT	<0.2	<10
Aug-06	NT	<0.2	<10
Dec-06	NT	<0.2	<10
Mar-07	NT	<0.2	<10
Jun-07	NT	<0.2	<10
Aug-07	NT	<0.2	<10
Dec-07	NT	<0.2	<10
Mar-08	NT	<0.2	<10
Jun-08	NT	<0.2	<10
Aug-08	NT	<0.2	<10
Dec-08	<0.2	0.7	0
Jun-09	<0.2	<0.2	0
Dec-09	<0.2	<0.2	0
Ohio EPA Effluent Tests (Composite Samples)[c]			
Jul-00	0.3	<0.2	5
Oct-00	0.3	<0.2	NA
Oct-07	<0.2	4.2	0
Aug-08	<0.2	<0.2	0

NT - Not tested
NA - Not available

a. Samples collected at approximately river mile 51.8
b. If mortality is 50% or greater in undiluted effluent:
TUa = 100 / LC50 (% effluent)
If mortality is less than 50% in undiluted effluent:
TUa = % Affected / 50
c. Ohio EPA test results for grab samples, acute mixing zone samples, and upstream river water samples (additional species) are provided in Appendix E and are consistent with those shown here.



KEY

NUMBER	NORTH PLANT AREA
SWMU 1	North Terminal Wastewater Treatment Plant (WWTP)
SWMU 2	North Terminal WWTP Concentrator Pit
SWMU 3	Terne Coat Flux Hazardous Waste Storage Area
SWMU 4	Terne Coat Dross Bucket Storage Area
SWMU 5	Terne Coat Satellite Accumulation Area
SWMU 6	PCB Storage Area (Door 7)
SWMU 7	Former Used Oil Reclamation Facility (Door 55A)
SWMU 8	Used Oil Reclamation Facility Number 2
SWMU 9	Former Used Oil Reclamation Facility Number 3 (Door 179A)
	MELT PLANT AREA
SWMU 10	Dorr Thickener and East Aboveground Tank
SWMU 11	Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds
SWMU 12	Blast Furnace/Sinter Plant Wastewater Treatment Facility
SWMU 13	BOF Wastewater Treatment Facility
SWMU 14	Coke Plant Wastewater Equalization Tank
SWMU 15	Former Coal Tar Decanter Sludge Recycling Area
SWMU 16	Former Coal Tar Decanter Sludge Collection Bin
SWMU 17	North Section of Former North Tar Lagoon (Near Robin Hood Coal Pile)
SWMU 18	Former Open Hearth WWTP
SWMU 19	Former Used Oil Storage Area
SWMU 20	Former Benzol Tank Farm Area (including Tar Tank Sludge Storage Area)
SWMU 21	Former Used Oil Accumulation Area (by Sinter Plant)
SWMU 44	Coke Oven Gas Pipeline and Release Area
AOC 1	Coke Quenching Water Collection Plant
AOC 2	Tar Tanks
AOC 4	Former Rail Car Transfer Area
AOC 5	PCB Transformer Storage Building (next to former Open Hearth WWTP)
AOC 6	Stormwater Sump and Release Areas
AOC 8	Benzene Release Area Possibly Related to AOC 2, Tar Tanks
AOC 20	AK/Armco proper ty at Oxford State Road (NS) and Ottawa Street (WS)
AOC 21	Dredge Spoil Fill Area - E/W diagonal fill area between Melt Area and South Plant (2000 feet on both sides of Jackson Lane Ditch)
	COIL PAINT AREA
SWMU 23	Former Coil Paint Wastewater Treatment Lagoons
	SOUTH PLANT AREA
SWMU 28	South Terminal WWTP
SWMU 29	South Terminal Wastewater Treatment Polishing Ponds
SWMU 30	Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets
SWMU 31	South Terminal Used Oil Recovery Facility
SWMU 32	Hot Slab (or Mill) WWTP
SWMU 33	Spent Pickle Liquor Tank Farm
SWMU 34	Spent Pickle Liquor Filtration System
HWMU 1	Easternmost Spent Pickle Liquor Injection Well (SWMU 35)
HWMU 2	Westernmost Spent Pickle Liquor Injection Well (SWMU 36)
SWMU 37	Solid Waste Transfer Area
SWMU 50	Former Slag Processing Area
AOC 22	Dredge Spoil Fill Area near corner of Jackson Lane and Lefferson Road
AOC 23	Dredge Spoil Fill Area near corner of Oxford State Road and North Branch of Dicks Creek
AOC 24	Dredge Spoil Fill Area on the nor th side and parallel to Oxford State Road running from North Branch of Dicks Creek to Jackson Lane Ditch (4000')
	SLAG PROCESSING AREA
SWMU 38	Closed Solid Waste Landfill by Yankee Road and Dicks Creek
SWMU 39	Closed CERCLA Notification Solid Waste Landfill (includes former ponds west of Monroe Ditch)
SWMU 40	Closed Solid Waste Landfill on West Side of Slag Processing Area
SWMU 41	Closed Solid Waste Landfill West of Slag Processing Area Access Road
SWMU 42	Closed Solid Waste Landfill East of Slag Processing Area Access Road
SWMU 43	Closed Solid Waste Landfill
SWMU 45	Interceptor Trench and Treatment System
SWMU 46	Current Oil Storage Area
SWMU 47	Former Oil Separator Ponds and vicinity
SWMU 48	Existing Fueling Area in SW part of OMS
SWMU 49	Former Kish Quenching Area
AOC 9	PCB Seep Area East of Outfall 002 on South side of Dicks Creek
AOC 10	PCB Seep Area Near Bend in Monroe Ditch
AOC 11	Mill Scale Area 1
AOC 12	Mill Scale Area 2
AOC 13	Mill Scale Area 3
AOC 14	Raw Slag Area
AOC 15	Finished Slag Area
AOC 16	7 Oil Transformer Locations (T in OMS Area)
AOC 17	Former Drainage Path from Former Oil Ponds (SWMU 47)
AOC 18	Floodplain Area West of Railroad Br idge in Vicinity of USEPA Samples S25/S28
AOC 19	Floodplain Area in front of Former Orman's Welding

LEGEND

AOC 7 AOC Location
T Transformer (AOC 16)
SWMU Solid Waste Management Unit
HWMU Hazardous Waste Management Unit

Notes:
Spatial information is meant for general reference

ARCADIS

Client:	AK Steel
Project:	OH000960.0015
Project Manager:	N. Gillotti
Cartography By:	L. Greene
Date:	03/31/2010

Figure 1

Map of SWMUs, HWMUs and AOCs AK Steel Corporation Middletown, Ohio

CITY:CLE DIV/GROUP: SER/IM DB:L.GREENE LD: PIC: PM: TM: TR:
Project (Project #)OH000960.0015
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KEY

AA 01	Floodplain Area West of Yankee Road (Vicinity of USEPA Sample S23)
AA 02	Former Cartage Property
AA 03	Sturgell Property
AA 04	Back Half of Properties between former Cartage and Sturgell Properties
AA 05	Former Armco Steel Lot (north of former meander)
AA 06	Former Burridge Machine Shop Property
AA 07	Former Osburn Lot
AA 08	Pipeline Fill Area, Adjacent to Station 36, along Oxford State Road
AA 09	Former Orman's Welding Property

Legend

AA 01 AA Location

Notes:
* Spatial information is meant for general reference

N

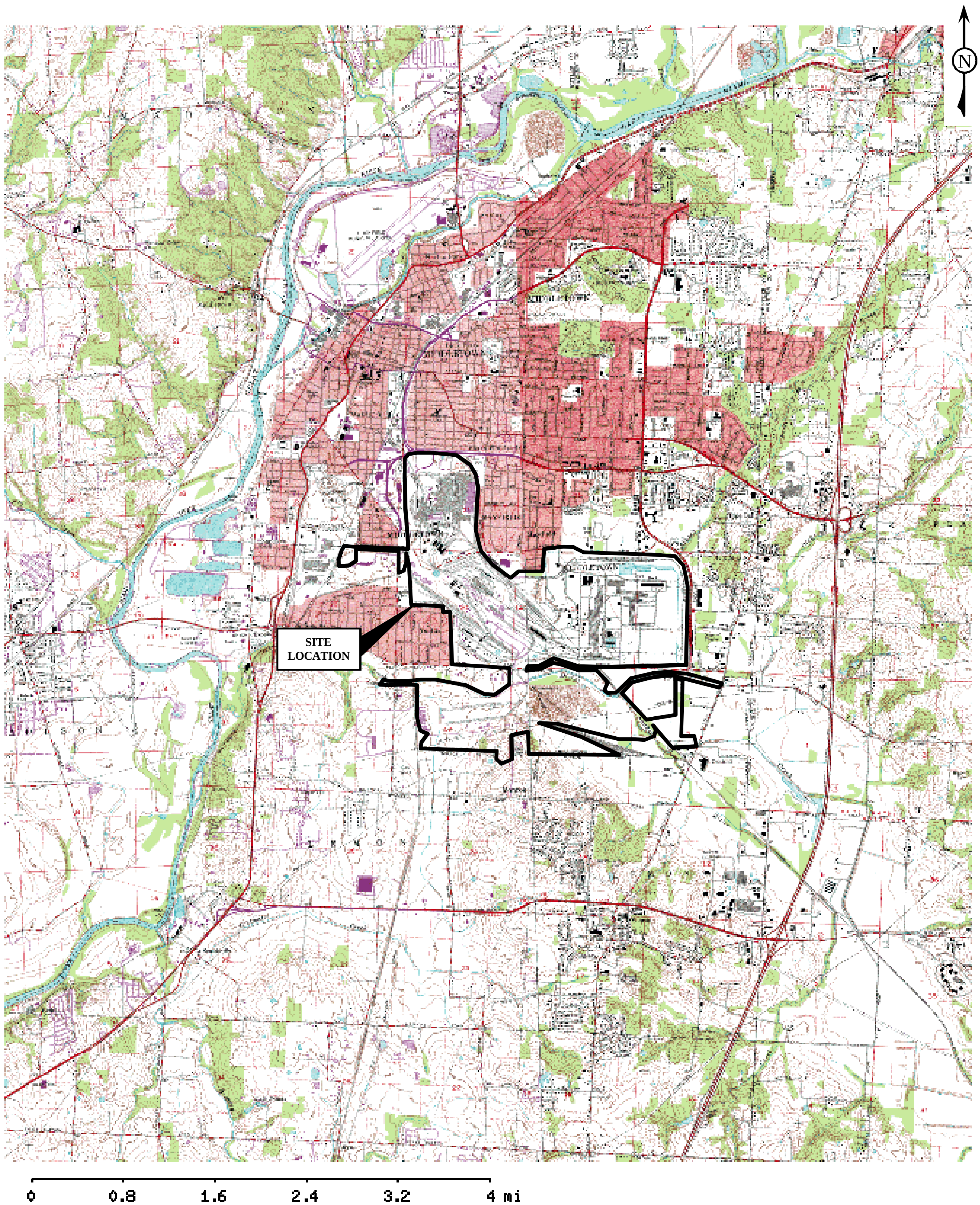
400 200 0 400 800 Feet

ARCADIS

Client:	AK Steel
Project:	OH000960.0015
Project Manager:	N. Gillotti
Cartography By:	L.Greene
Date:	03/31/2010

Figure 2

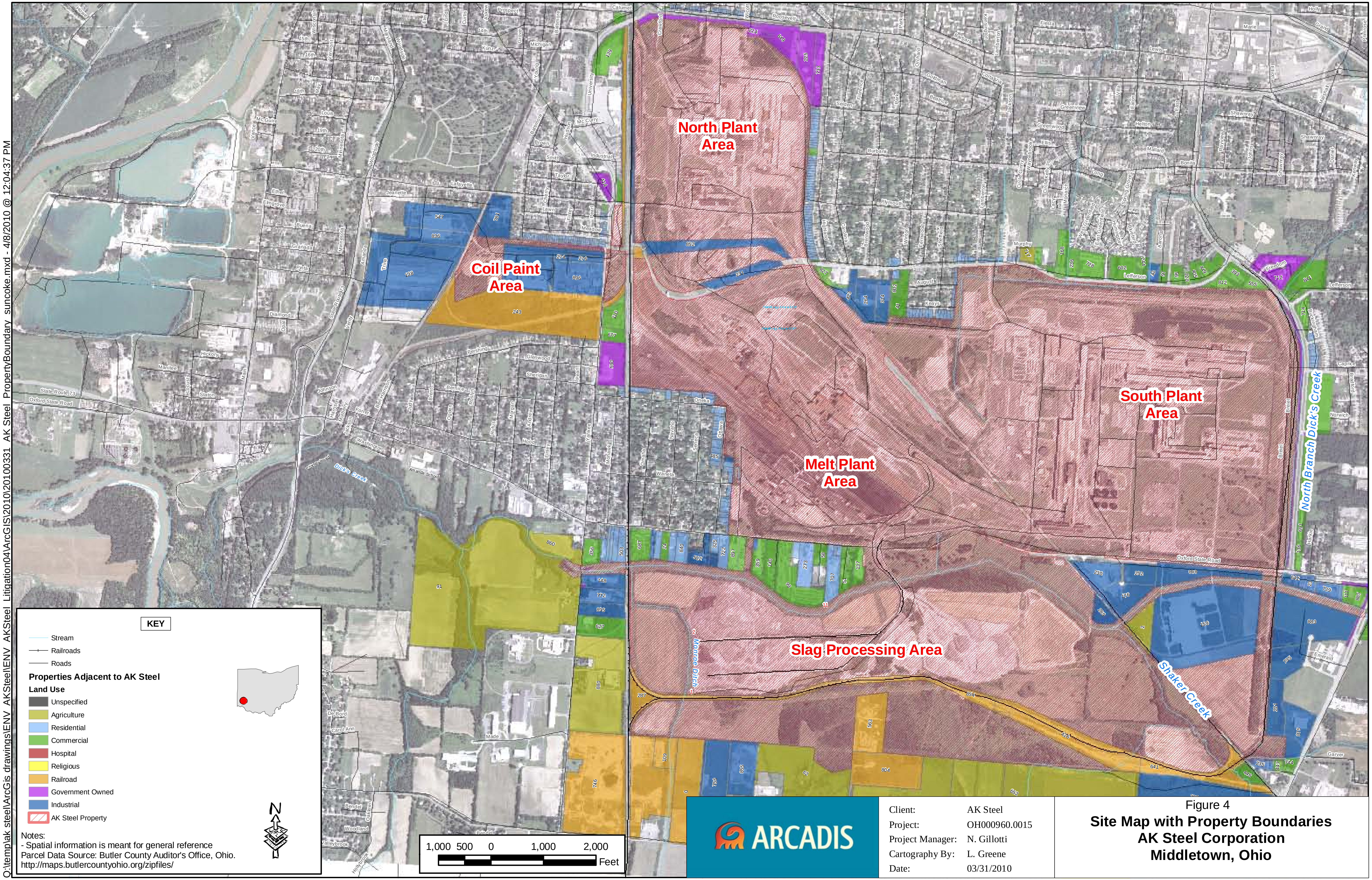
Additional Areas for Evaluation
AK Steel Corporation
Middletown, Ohio



ARCADIS

SITE LOCATION MAP
AK STEEL CORPORATION
MIDDLETOWN, OHIO

Date	Project Manager	Drawing Name
3/24/2009	N. GILLOTTI	AK\06\SITE LOCAT
Drawn By	Lead Design Prof.	Checked
R. SMITH	J. REID	T. FORTNER
Project Number		Figure Number
OH000960.0015		3



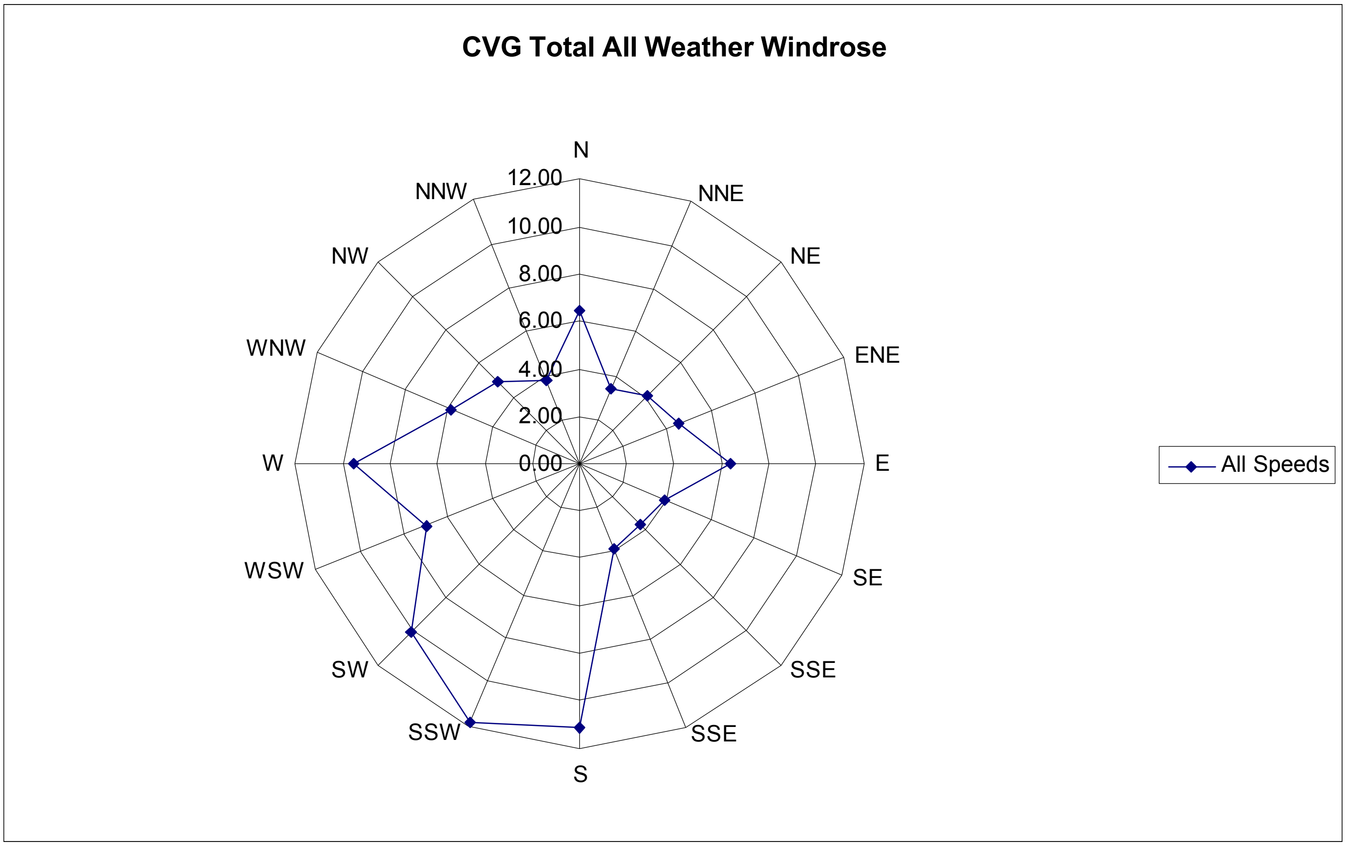
ARCADIS

Client:	AK Steel
Project:	OH000960.0015
Project Manager:	N. Gillotti
Cartography By:	L. Greene
Date:	03/31/2010

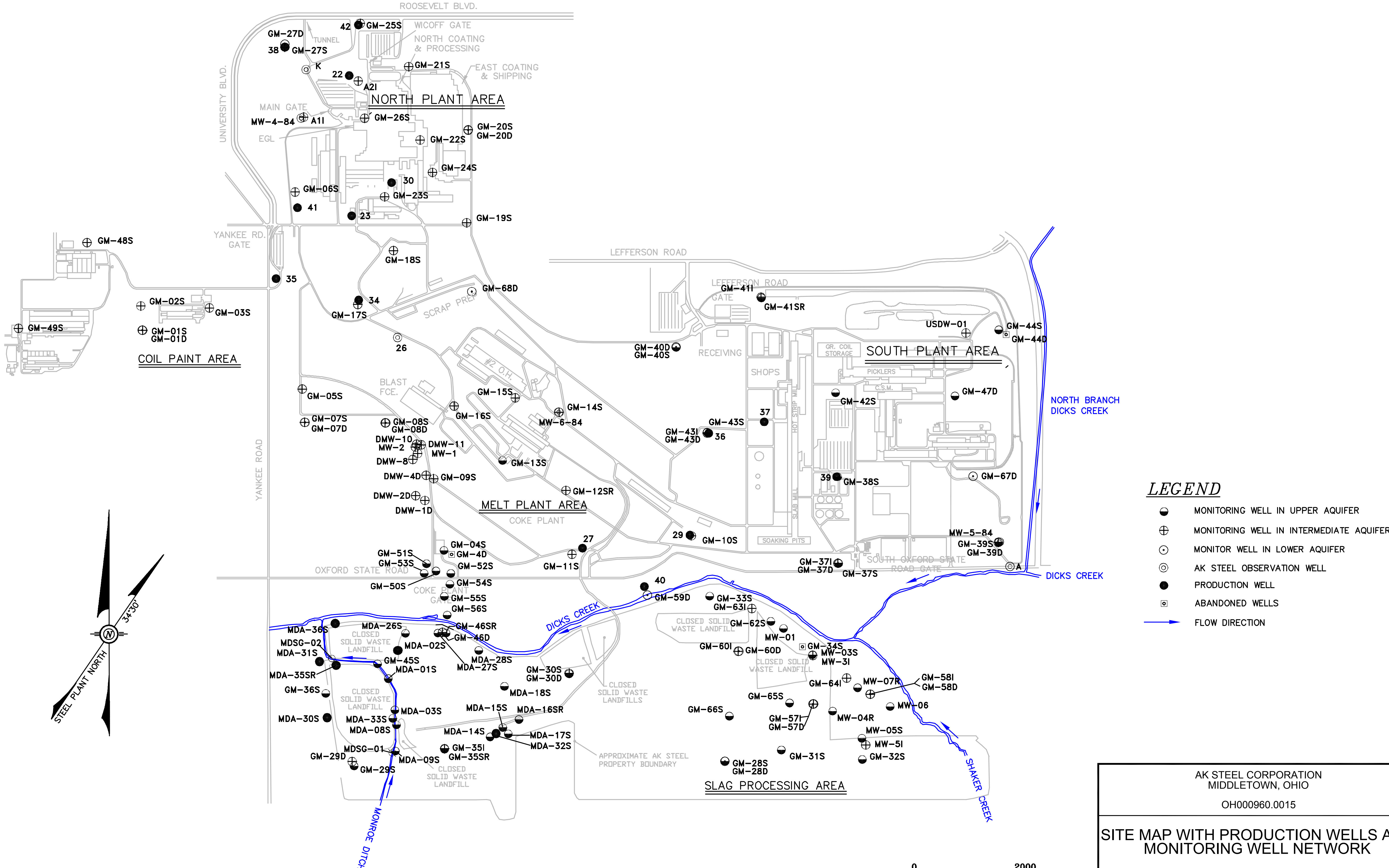
Figure 4
Site Map with Property Boundaries
AK Steel Corporation
Middletown, Ohio

CITY:CLE DIV/GROUP:SER/IM DB:L.GREENE LD: PIC: PM: TM: TR:
Project (Project #)OH000960.0015
O:\temp\ak steel\ArcGis drawings\ENV AKSteel\ENV AKSteel Litigation04\ArcGIS\2010\20100331 AK Steel PropertyBoundary suncoke.mxd - 4/8/2010 @ 12:04:37 PM

Cincinnati/Northern Kentucky International Airport (CVG)
Wind Rose Diagram
National Oceanic and Atmospheric Administration (NOAA)
Analysis Years 1973-2002



ARCADIS	WIND ROSE DIAGRAM AK STEEL CORPORATION MIDDLETOWN, OHIO	Date 8/22/2006	Project Manager N. GILLOTTI	Drawing Name AK\06\WIND ROSE
		Drawn By R. SMITH	Lead Design Prof. J. REID	Checked J. MANZO
		Project Number OH000960.0015		Figure Number 5



AK STEEL CORPORATION
MIDDLETOWN, OHIO

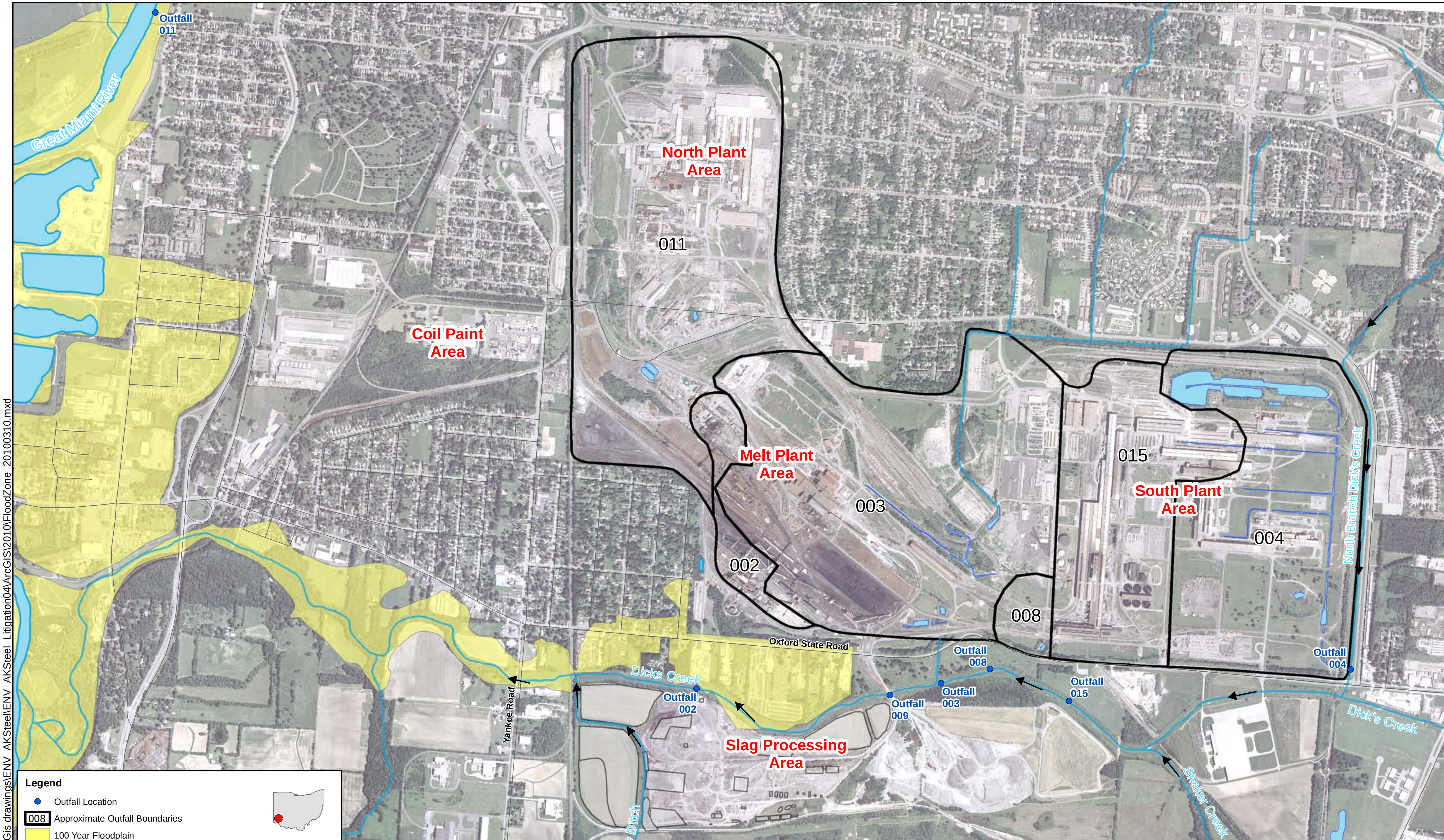
OH000960.0015

SITE MAP WITH PRODUCTION WELLS AND MONITORING WELL NETWORK

ARCADIS

FIGURE
6

CadCo. AK754298.DWG 12/15/94 PS: 1=600



Legend

- Outfall Location
- 008 Approximate Outfall Boundaries
- 100 Year Floodplain

Notes:
- Spatial information is meant for general reference

Source:
- 100 Year Floodplain was obtained from Ohio DNR (http://www.dnr.state.oh.us/gims/). The data was based off of Butler County FEMA NFIP maps dated 1977. The data is current as of 2001 with a positional accuracy of 40 feet.

N

1,500 750 0 1,500 3,000 Feet

ARCADIS

Client:	AK Steel
Project:	OH 000960.0015
Project Manager:	N. Gillotti
Cartography By:	L. Greene
Date:	03/10/2010

Figure 7

Floodplain Map, Surface Water Features and Drainage Patterns
AK Steel Corporation
Middletown, Ohio

CITY:CLE DIV/GROUP:SER/IM DB:L.GREENE LD: PIC: PM: TM: TR:
Project (Project #)OH000960.0015
Q:\templak steel\ArcGis drawings\ENV_AKSteel\ENV_AKSteel_Litigation04\ArcGIS\2010\FloodZone_20100310.mxd

ENVIRON

13801 West Center St., Burton, OH 44021

Great Miami River (River Miles 49-52)
AK Steel Corporation
Middletown, Ohio

Figure 8

Drafter: R. Osborn | Contract Number: 2122319A | Approved: T. Barber

Wednesday, March 17, 2010 3:07:59 PM
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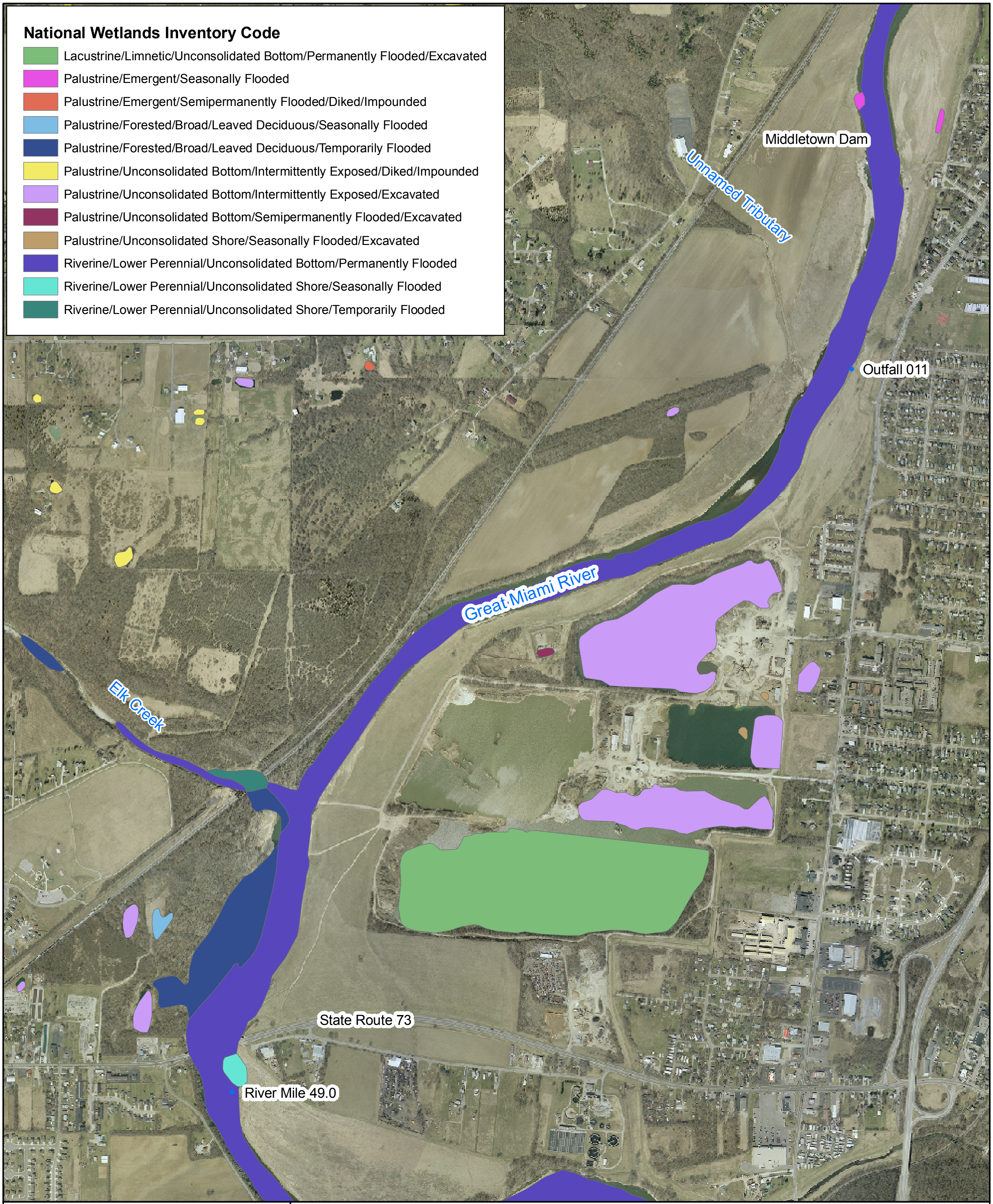

ENVIRON

13801 West Center St., Burton, OH 44021

Figure 9

National Wetlands Inventory: Great Miami River
AK Steel Corporation
Middletown, Ohio

Drafter: E. Martin | Contract Number: 2116436A | Approved: T. Barber

Tuesday, August 29, 2006 2:44:41 PM
\\Mesrv01\Client_Files\AK Steel\Data\GIS_Projects\CurrentConditionsReport\Figure10_GreatMiamiRiver_NWI.mxd

ENVIRON

13801 West Center St., Burton, OH 44021

Figure 10

Woodland Habitat Areas Adjacent to AK Steel Middletown Works Facility
AK Steel Corporation
Middletown, Ohio

Drafter: E. Martin | Contract Number: 2116436A | Approved: T. Barber

Thursday, September 7, 2006 2:25:56 PM
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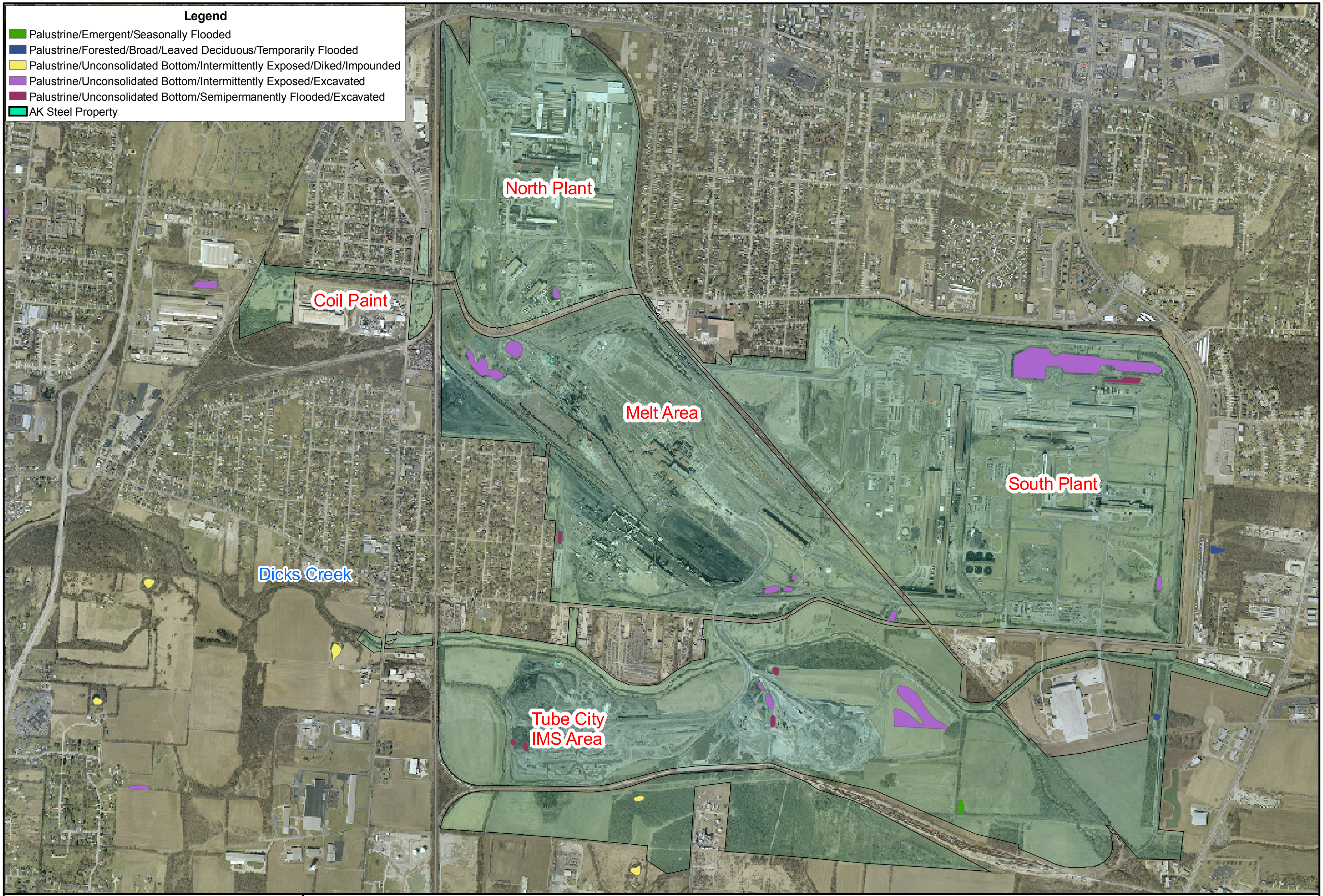

ENVIRON

13801 West Center St., Burton, OH 44021

Figure 11

National Wetlands Inventory: AK Steel Middletown Works Facility
AK Steel Corporation
Middletown, Ohio

Drafter: E. Martin | Contract Number: 2116436A | Approved: T. Barber

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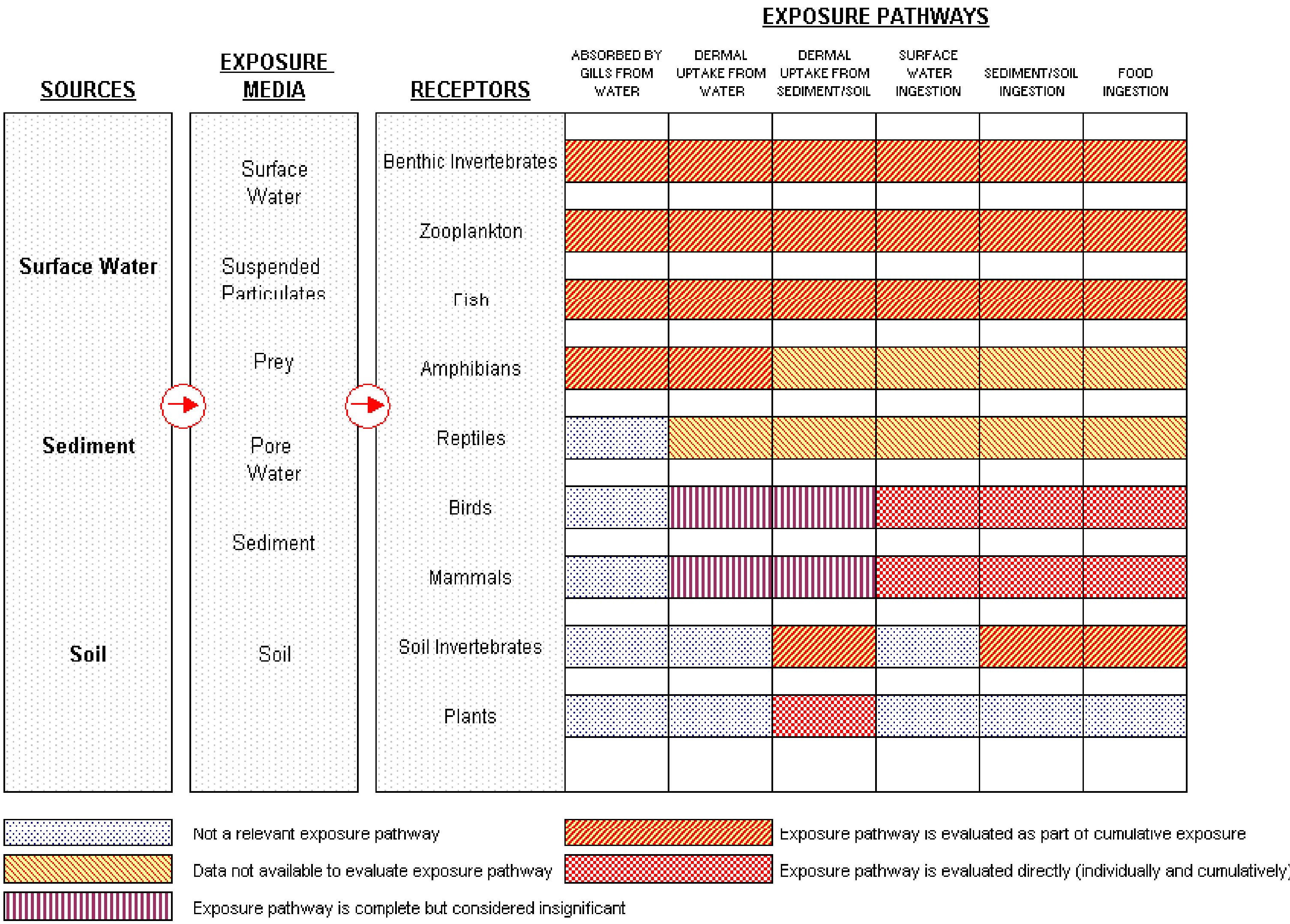
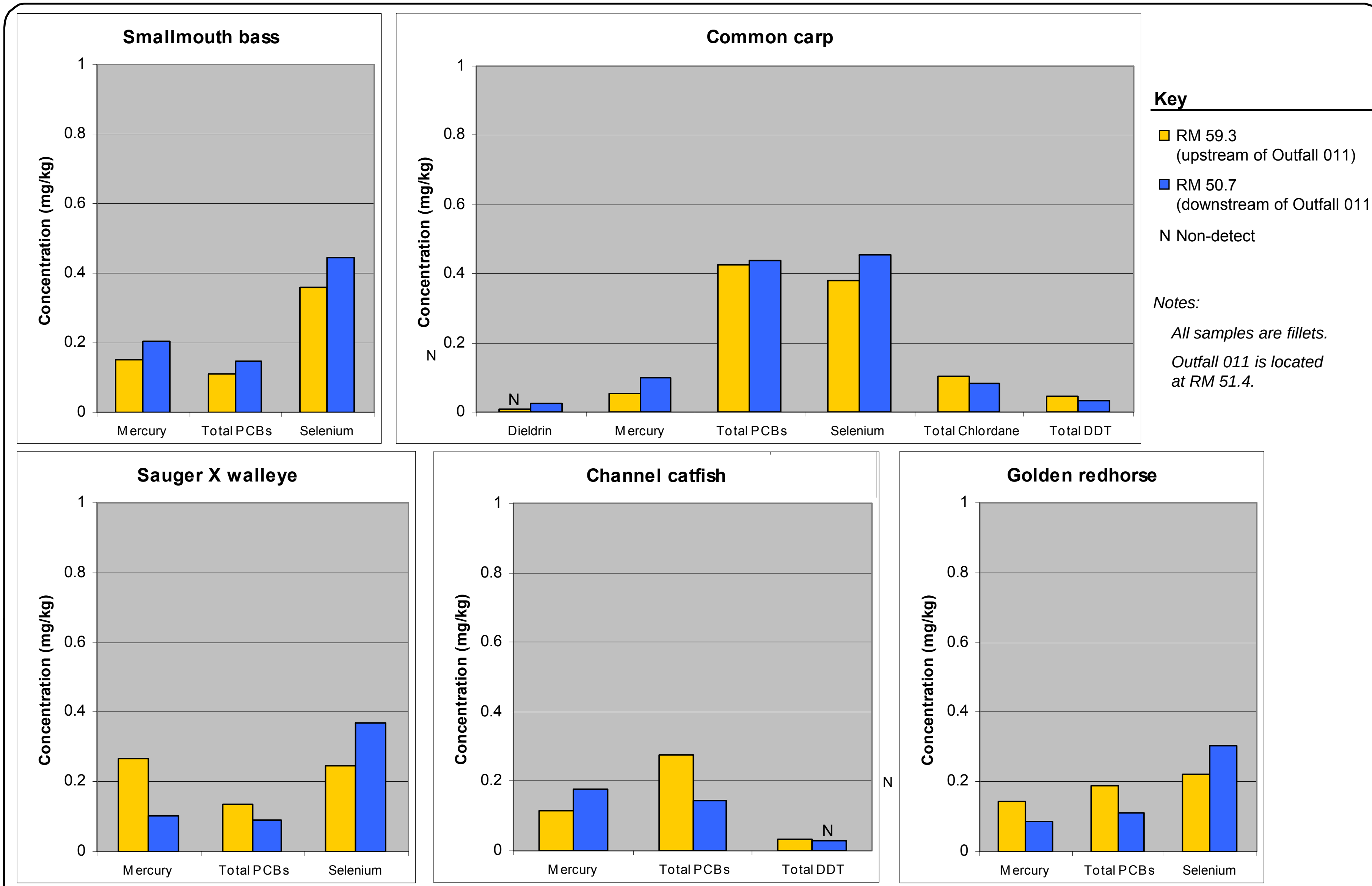


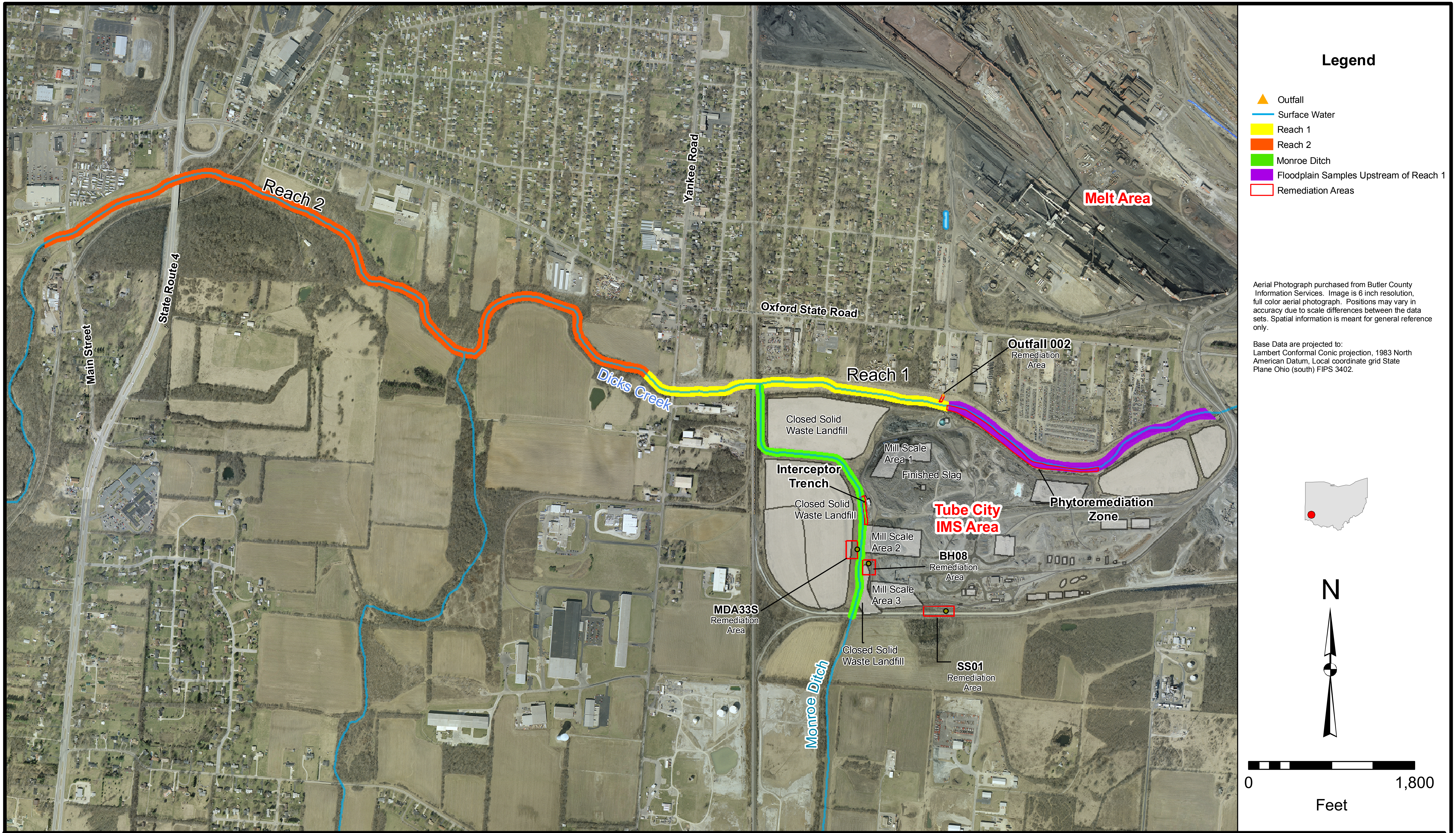
ENVIRON

Figure 12
Exposure Pathways for Ecological Receptors and Selection of Pathways for Evaluation



ENVIRON

Figure 13. Spatial Trends in Great Miami River Fish Tissue Concentrations
AK Steel Corporation, Middletown, Ohio



ENVIRON

13801 West Center St., Burton, OH 44021

Interim Measures Overview
Dicks Creek Study Area
Middletown, Ohio

Figure 14

Drafter: E. Martin | Contract Number: 2012972B | Approved: T. Barber

Friday, August 18, 2006 3:38:38 PM
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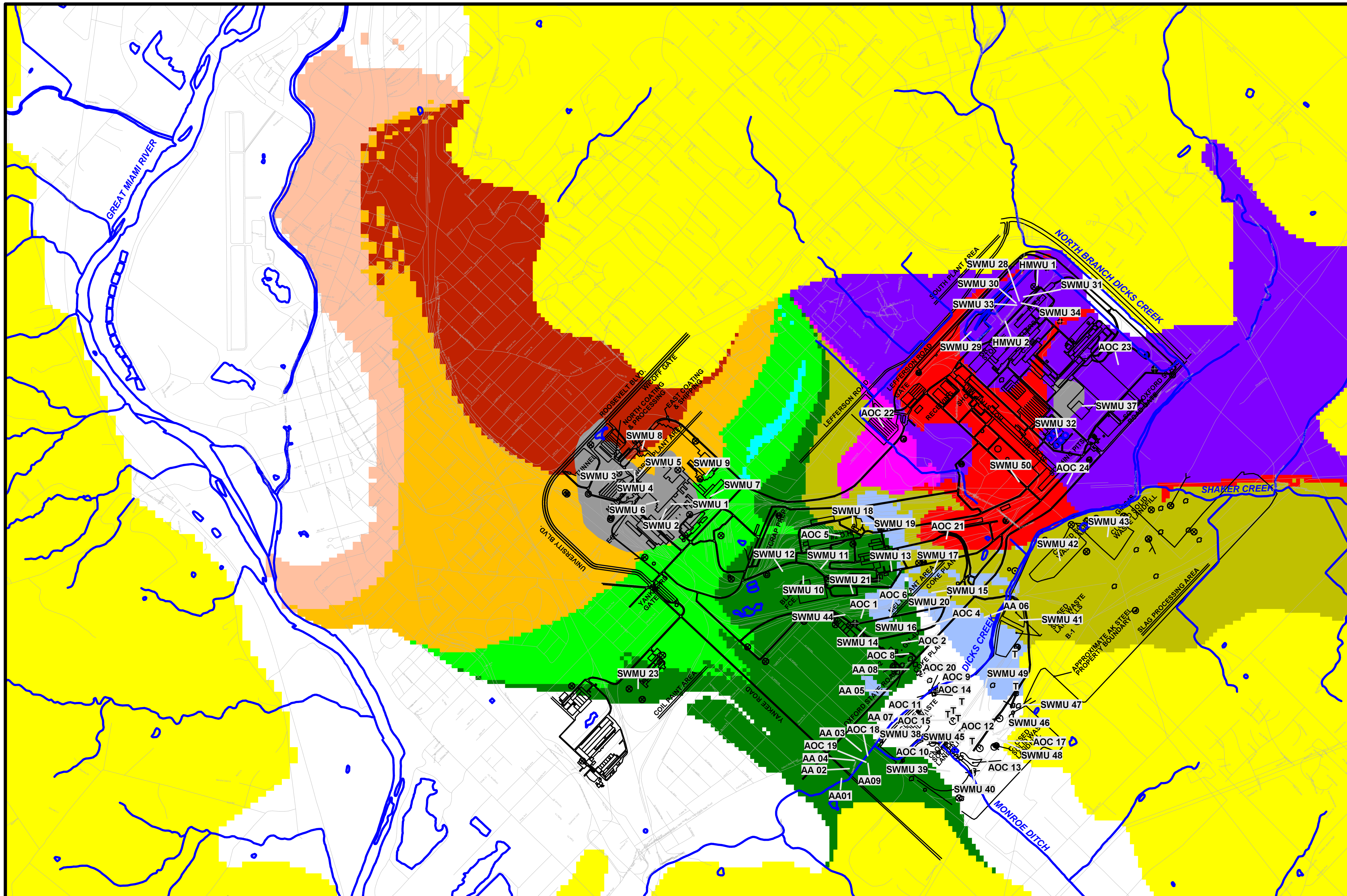
KEY

NUMBER	NORTH PLANT AREA
SWMU 1	North Terminal Wastewater Treatment Plant (WWTP)
SWMU 2	North Terminal WWTP Concentrator Pit
SWMU 3	Terne Coat Flux Hazardous Waste Storage Area
SWMU 4	Terne Coat Dross Bucket Storage Area
SWMU 5	Terne Coat Satellite Accumulation Area
SWMU 6	PCB Storage Area (Door 7)
SWMU 7	Former Used Oil Reclamation Facility (Door 55A)
SWMU 8	Used Oil Reclamation Facility Number 2
SWMU 9	Former Used Oil Reclamation Facility Number 3 (Door 179A)
	MELT PLANT AREA
SWMU 10	Dorr Thickener and East Aboveground Tank
SWMU 11	Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds
SWMU 12	Blast Furnace/Sinter Plant Wastewater Treatment Facility
SWMU 13	BOF Wastewater Treatment Facility
SWMU 14	Coke Plant Wastewater Equalization Tank
SWMU 15	Former Coal Tar Decanter Sludge Recycling Area
SWMU 16	Former Coal Tar Decanter Sludge Collection Bin
SWMU 17	North Section of Former North Tar Lagoon (Near Robin Hood Coal Pile)
SWMU 18	Former Open Hearth WWTP
SWMU 19	Former Used Oil Storage Area
SWMU 20	Former Benzol Tank Farm Area (including Tar Tank Sludge Storage Area)
SWMU 21	Former Used Oil Accumulation Area (by Sinter Plant)
SWMU 44	Coke Oven Gas Pipeline and Release Area
AOC 1	Coke Quenching Water Collection Plant
AOC 2	Tar Tanks
AOC 4	Former Rail Car Transfer Area
AOC 5	PCB Transformer Storage Building (next to former Open Hearth WWTP)
AOC 6	Stormwater Sump and Release Areas
AOC 8	Benzene Release Area Possibly Related to AOC 2, Tar Tanks
AOC 20	AK/Armco property at Oxford State Road (NS) and Ottawa Street (WS)
AOC 21	Dredge Spoil Fill Area - E/W diagonal fill area between Melt Area and South Plant (2000 feet on both sides of Jackson Lane Ditch)
	COIL PAINT AREA
SWMU 23	Former Coil Paint Wastewater Treatment Lagoons
	SOUTH PLANT
SWMU 28	South Terminal WWTP
SWMU 29	South Terminal Wastewater Treatment Polishing Ponds
SWMU 30	Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets
SWMU 31	South Terminal Used Oil Recovery Facility
SWMU 32	Hot Slab (or Mill) WWTP
SWMU 33	Spent Pickle Liquor Tank Farm
SWMU 34	Spent Pickle Liquor Filtration System
HWMU 1	Easternmost Spent Pickle Liquor Injection Well (SWMU 35)
HWMU 2	Westernmost Spent Pickle Liquor Injection Well (SWMU 36)
SWMU 37	Solid Waste Transfer Area
SWMU 50	Former Slag Processing Area
AOC 22	Dredge Spoil Fill Area near corner of Jackson Lane and Lefferson Road
AOC 23	Dredge Spoil Fill Area near corner of Oxford State Road and North Branch of Dicks Creek
AOC 24	Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from North Branch of Dicks Creek to Jackson Lane Ditch (4000')
	SLAG PROCESSING AREA
SWMU 38	Closed Solid Waste Landfill by Yankee Road and Dicks Creek
SWMU 39	Closed CERCLA Notification Solid Waste Landfill (includes former ponds west of Monroe Ditch)
SWMU 40	Closed Solid Waste Landfill on West Side of Slag Processing Area
SWMU 41	Closed Solid Waste Landfill West of Slag Processing Area Access Road
SWMU 42	Closed Solid Waste Landfill East of Slag Processing Area Access Road
SWMU 43	Closed Solid Waste Landfill
SWMU 45	Interceptor Trench and Treatment System
SWMU 46	Current Oil Storage Area
SWMU 47	Former Oil Separator Ponds and vicinity
SWMU 48	Existing Fueling Area in SW part of OMS
SWMU 49	Former Kish Quenching Area
AOC 9	PCB Seep Area East of Outfall 002 on South side of Dicks Creek
AOC 10	PCB Seep Area Near Bend in Monroe Ditch
AOC 11	Mill Scale Area 1
AOC 12	Mill Scale Area 2
AOC 13	Mill Scale Area 3
AOC 14	Raw Slag Area
AOC 15	Finished Slag Area
AOC 16	7 Oil Transformer Locations ("T" in OMS Area)
AOC 17	Former Drainage Path from Former Oil Ponds (SWMU 47)
AOC 18	Floodplain Area West of Railroad Bridge in Vicinity of USEPA Samples S25/S28
AOC 19	Floodplain Area in front of Former Orman's Welding
	ADDITIONAL AREAS
AA 01	Flood Plain Area West of Yankee Road in the Vicinity of USEPA Sample S23
AA 02	Former Glenn Cartage Property (NS of DC, East of Yankee Road)
AA 03	Sturgell Property (NS of DC, West of RR Bridge, East of Yankee Road)
AA 04	Back Half of Properties between Cartage and Sturgell Properties (NS of DC)
AA 05	Old Armco Lot NS DC, North of Big Meander
AA 06	Former Burridge Machine Shop Property, NS DC (Now a Dairly Outlet)
AA 07	Former Cecil Osburn Lot (Located Between Station 12-18, NS of DC)
AA 08	Pipeline Fill, Stations 32-36, along Oxford State Road, North of Outfall 002
AA 09	Former Orman's Welding Property



LEGEND

- Surface Water Feature
- No Flow Cell
- Dry Area

Well ID	Simulated Rate (gpm)	Capture Zone Color
22	407	
23	288	
27	140	
29	346	
30	2	
34	487	
35	OFF	NA
36	104	
37	OFF	NA
38	356	
39	1,495	
40	694	
42	378	

N

Scale in Feet

0 2,500 5,000

AK STEEL CORPORATION
MIDDLETOWN, OHIO
OH000960.0015

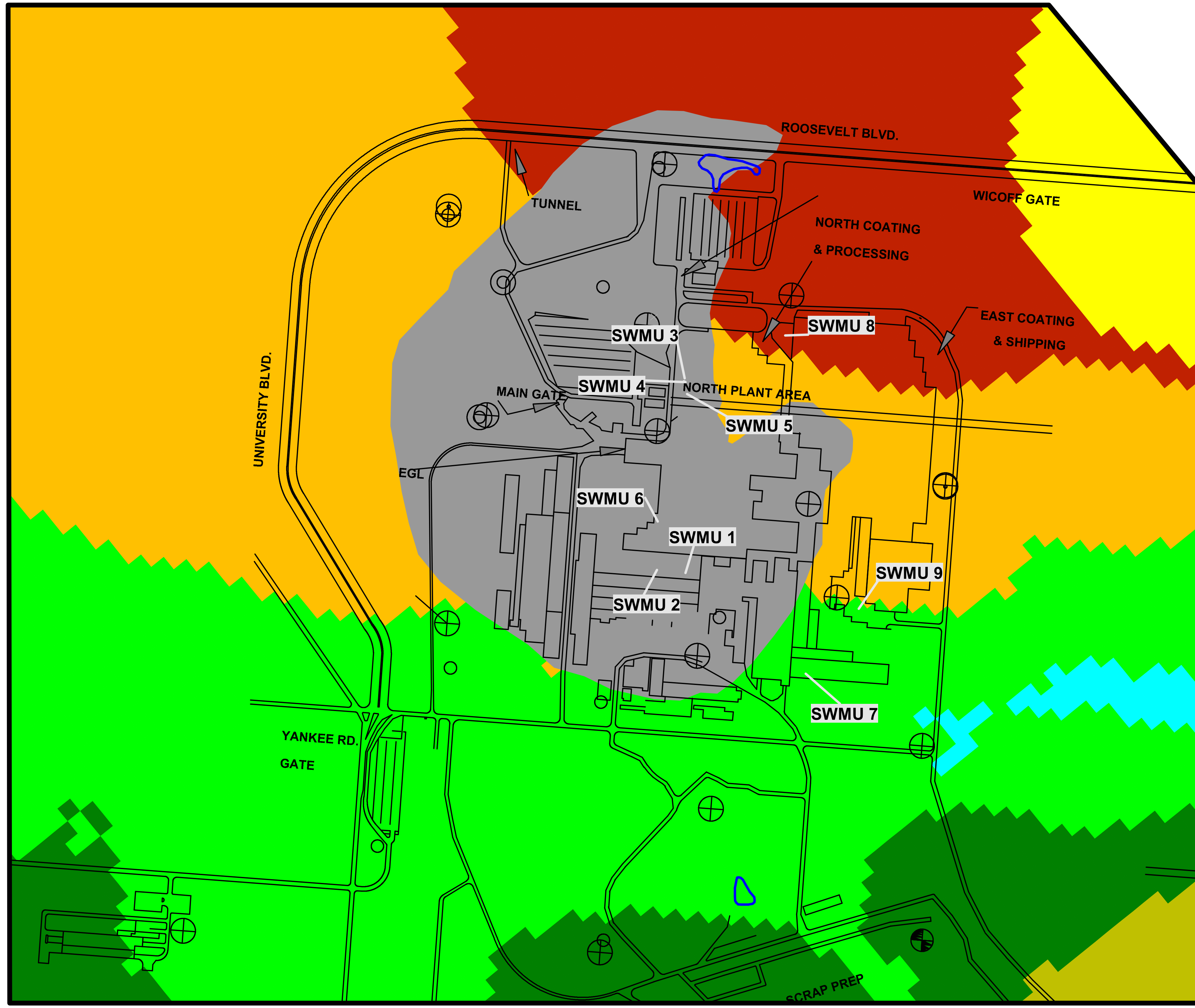
SITE-WIDE SIMULATED
ON-SITE CAPTURE IN MODEL LAYER 1
DECEMBER 2008

ARCADIS

FIGURE
15

KEY

NUMBER	NORTH PLANT AREA
SWMU 1	North Terminal Wastewater Treatment Plant (WWTP)
SWMU 2	North Terminal WWTP Concentrator Pit
SWMU 3	Terne Coat Flux Hazardous Waste Storage Area
SWMU 4	Terne Coat Dross Bucket Storage Area
SWMU 5	Terne Coat Satellite Accumulation Area
SWMU 6	PCB Storage Area (Door 7)
SWMU 7	Former Used Oil Reclamation Facility (Door 55A)
SWMU 8	Used Oil Reclamation Facility Number 2
SWMU 9	Former Used Oil Reclamation Facility Number 3 (Door 179A)

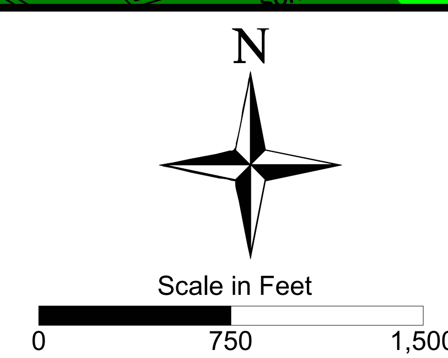


LEGEND

No Flow Cell

Dry Area

Well ID	Simulated Rate (gpm)	Capture Zone Color
22	407	
23	288	
27	140	
29	346	
30	2	
34	487	
35	OFF	NA
36	104	
37	OFF	NA
38	356	
39	1,495	
40	694	
42	378	



AK STEEL CORPORATION
MIDDLETOWN, OHIO
OH000960.0015

NORTH PLANT AREA
SIMULATED CAPTURE IN MODEL LAYER 1
DECEMBER 2008

ARCADIS

FIGURE
16

KEY

NUMBER	MELT PLANT AREA
SWMU 10	Dorr Thickener and East Aboveground Tank
SWMU 11	Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds
SWMU 12	Blast Furnace/Sinter Plant Wastewater Treatment Facility
SWMU 13	BOF Wastewater Treatment Facility
SWMU 14	Coke Plant Wastewater Equalization Tank
SWMU 15	Former Coal Tar Decanter Sludge Recycling Area
SWMU 16	Former Coal Tar Decanter Sludge Collection Bin
SWMU 17	North Section of Former North Tar Lagoon (Near Robin Hood Coal Pile)
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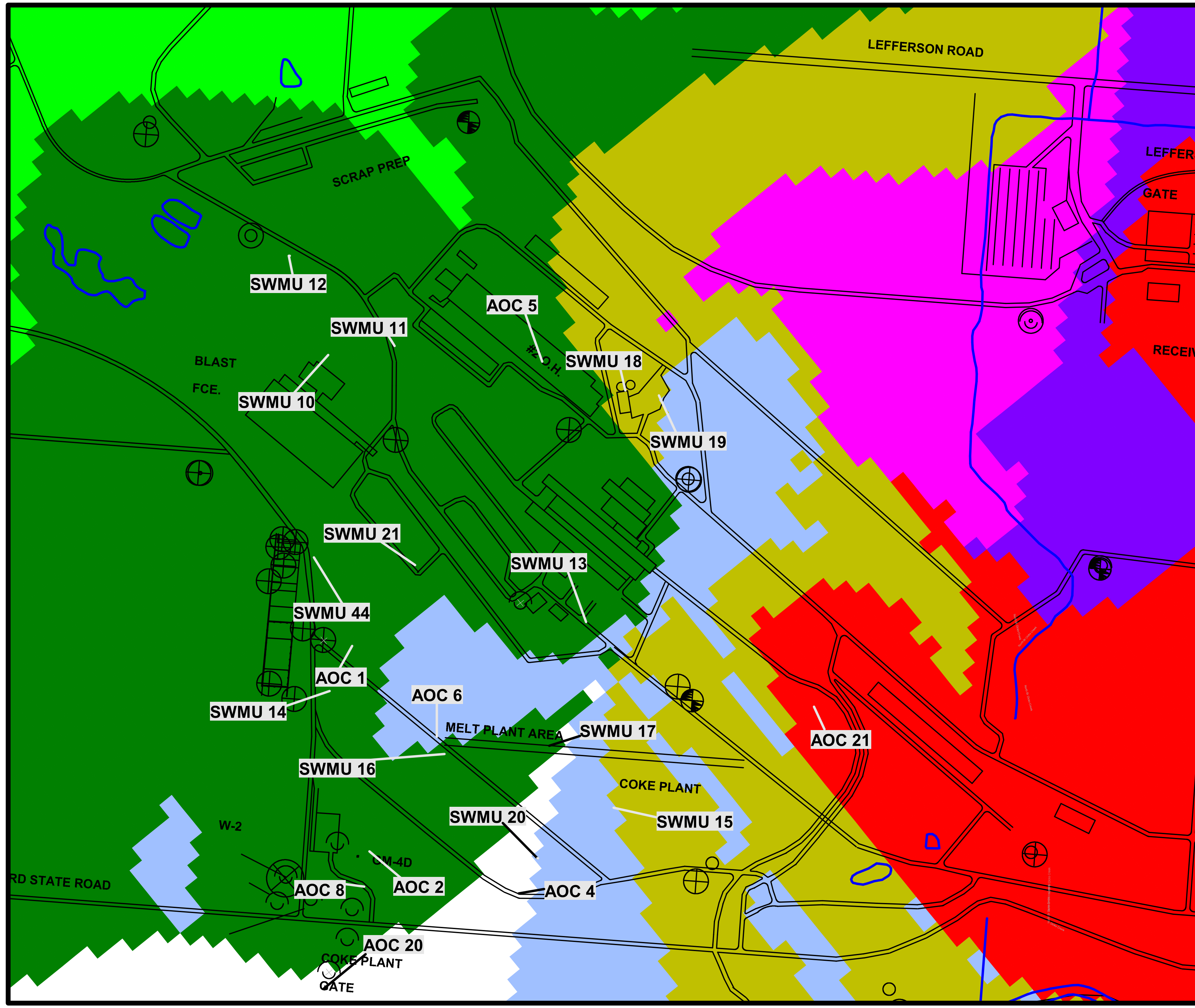

LEGEND

No Flow Cell

Dry Area

Well ID	Simulated Rate (gpm)	Capture Zone Color
22	407	
23	288	
27	140	
29	346	
30	2	
34	487	
35	OFF	NA
36	104	
37	OFF	NA
38	356	
39	1,495	
40	694	
42	378	

N

Scale in Feet

0 750 1,500

AK STEEL CORPORATION
MIDDLETOWN, OHIO
OH000960.0015

MELT PLANT AREA
SIMULATED CAPTURE IN MODEL LAYER 1
DECEMBER 2008

ARCADIS

FIGURE
17

KEY

NUMBER	SOUTH PLANT
SWMU 28	South Terminal WWTP
SWMU 29	South Terminal Wastewater Treatment Polishing Ponds
SWMU 30	Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets
SWMU 31	South Terminal Used Oil Recovery Facility
SWMU 32	Hot Slab (or Mill) WWTP
SWMU 33	Spent Pickle Liquor Tank Farm
SWMU 34	Spent Pickle Liquor Filtration System
HWMU 1	Easternmost Spent Pickle Liquor Injection Well (SWMU 35)
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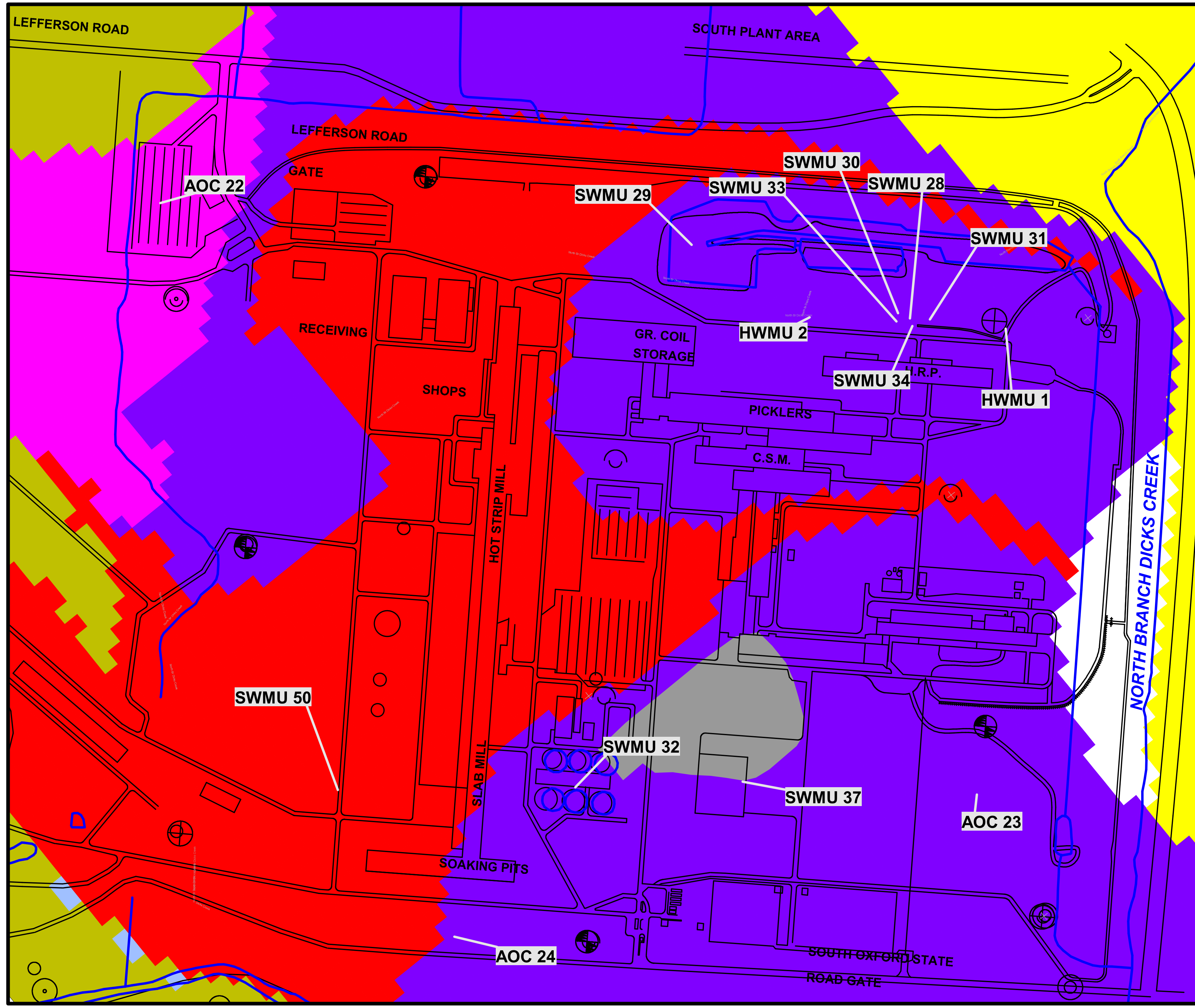

LEGEND

Surface Water Feature

No Flow Cell

Dry Area

Well ID	Simulated Rate (gpm)	Capture Zone Color
22	407	
23	288	
27	140	
29	346	
30	2	
34	487	
35	OFF	NA
36	104	
37	OFF	NA
38	356	
39	1,495	
40	694	
42	378	

N

Scale in Feet

0 750 1,500

AK STEEL CORPORATION
MIDDLETOWN, OHIO
OH000960.0015

SOUTH PLANT AREA
SIMULATED CAPTURE IN MODEL LAYER 1
DECEMBER 2008

ARCADIS

FIGURE
18

KEY

NUMBER	SLAG PROCESSING AREA
SWMU 38	Closed Solid Waste Landfill by Yankee Road and Dicks Creek
SWMU 39	Closed CERCLA Notification Solid Waste Landfill (includes former ponds west of Monroe Ditch)
SWMU 40	Closed Solid Waste Landfill on West Side of Slag Processing Area
SWMU 41	Closed Solid Waste Landfill West of Slag Processing Area Access Road
SWMU 42	Closed Solid Waste Landfill East of Slag Processing Area Access Road
SWMU 43	Closed Solid Waste Landfill
SWMU 45	Interceptor Trench and Treatment System
SWMU 46	Current Oil Storage Area
SWMU 47	Former Oil Separator Ponds and vicinity
SWMU 48	Existing Fueling Area in SW part of OMS

NUMBER	SLAG PROCESSING AREA
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AOC 9	PCB Seep Area East of Outfall 002 on South side of Dicks Creek
AOC 10	PCB Seep Area Near Bend in Monroe Ditch
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AOC 12	Mill Scale Area 2
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AOC 17	Former Drainage Path from Former Oil Ponds (SWMU 47)
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AOC 19	Floodplain Area in front of Former Orman's Welding

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AA 02	Former Glenn Cartage Property (NS of DC, East of Yankee Road)
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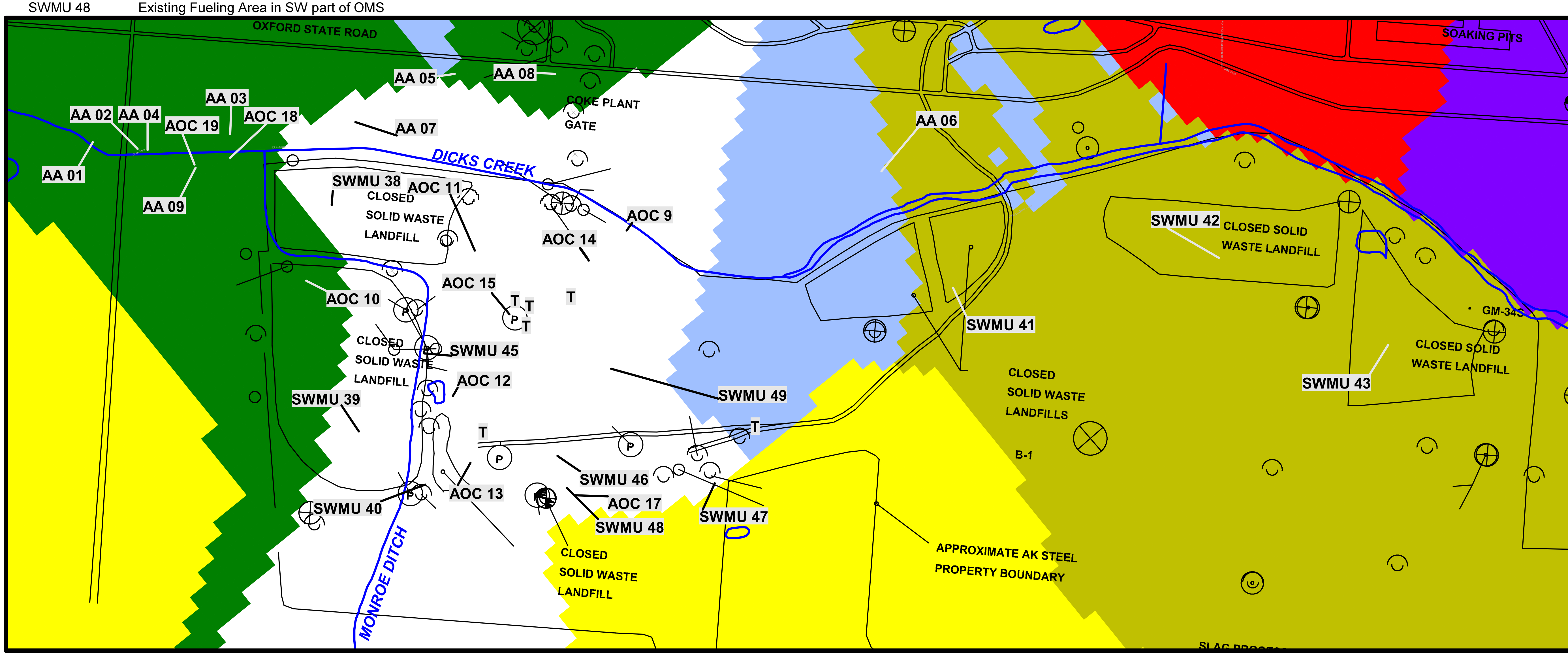
AA 09	Former Orman's Welding Property



LEGEND

Surface Water Feature

No Flow Cell

Dry Area

Well ID	Simulated Rate (gpm)	Capture Zone Color
22	407	
23	288	
27	140	
29	346	
30	2	
34	487	
35	OFF	NA
36	104	
37	OFF	NA
38	356	
39	1,495	
40	694	
42	378	

N

Scale in Feet

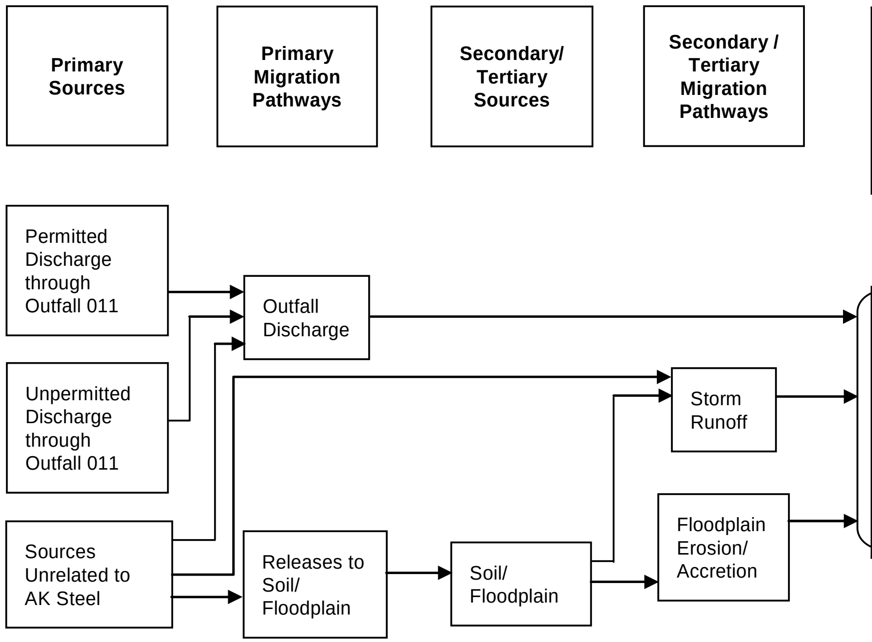
0 750 1,500

AK STEEL CORPORATION
MIDDLETOWN, OHIO
OH000960.0015

SLAG PROCESSING AREA
SIMULATED CAPTURE IN MODEL LAYER 1
DECEMBER 2008

ARCADIS

FIGURE 19

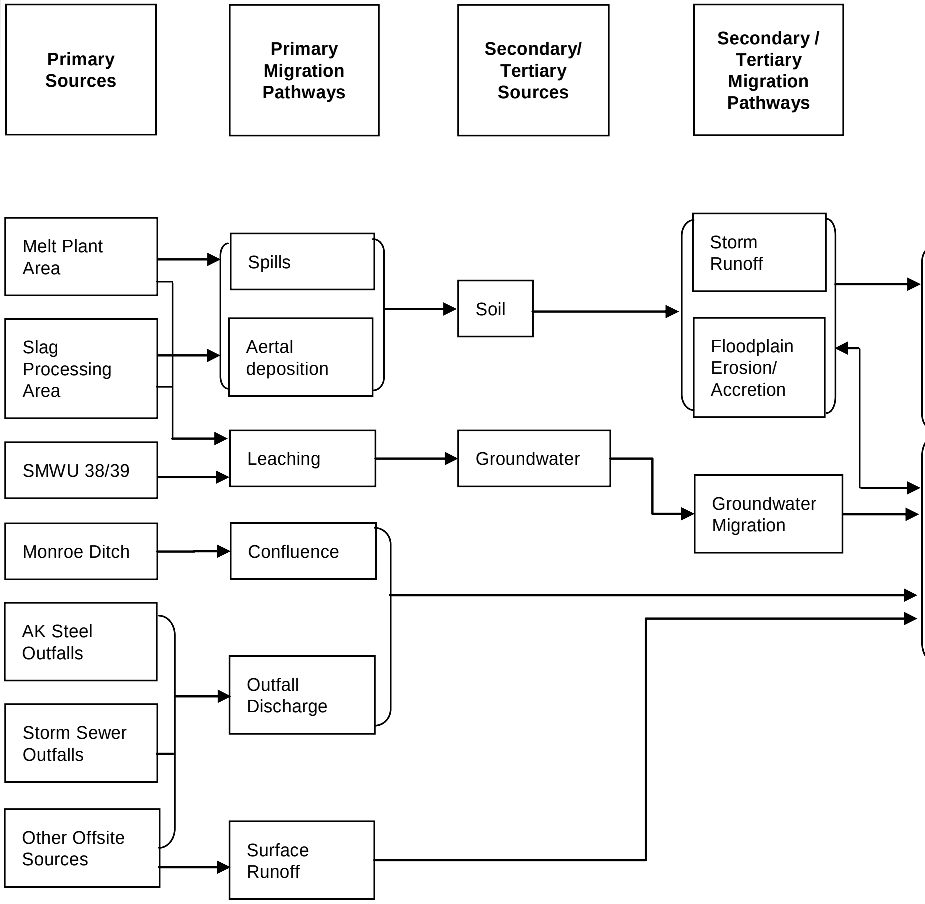


Exposure Media	Exposure Pathways	Human Health Receptors of Interest (ROIs)	Ecological ROIs		
		Recreational User	Invertebrates	Fish	Aquatic-Feeding Wildlife
Great Miami River Surface Water Sediment	Direct contact with water	✓	✓	✓	✓
	Water ingestion	✓	✓	✓	✓
	Inhalation of water vapor	✓			
	Direct contact with sediment	✓	✓	✓	✓
	Sediment ingestion	✓	✓	✓	✓
	Fish/prey ingestion	✓	✓	✓	✓

✓ Potentially complete exposure pathway, currently and in the future

◆ Potentially complete exposure pathway in the future

Figure 20. Preliminary Site Conceptual Model for Great Miami River, AK Steel Corporation, Middletown, Ohio

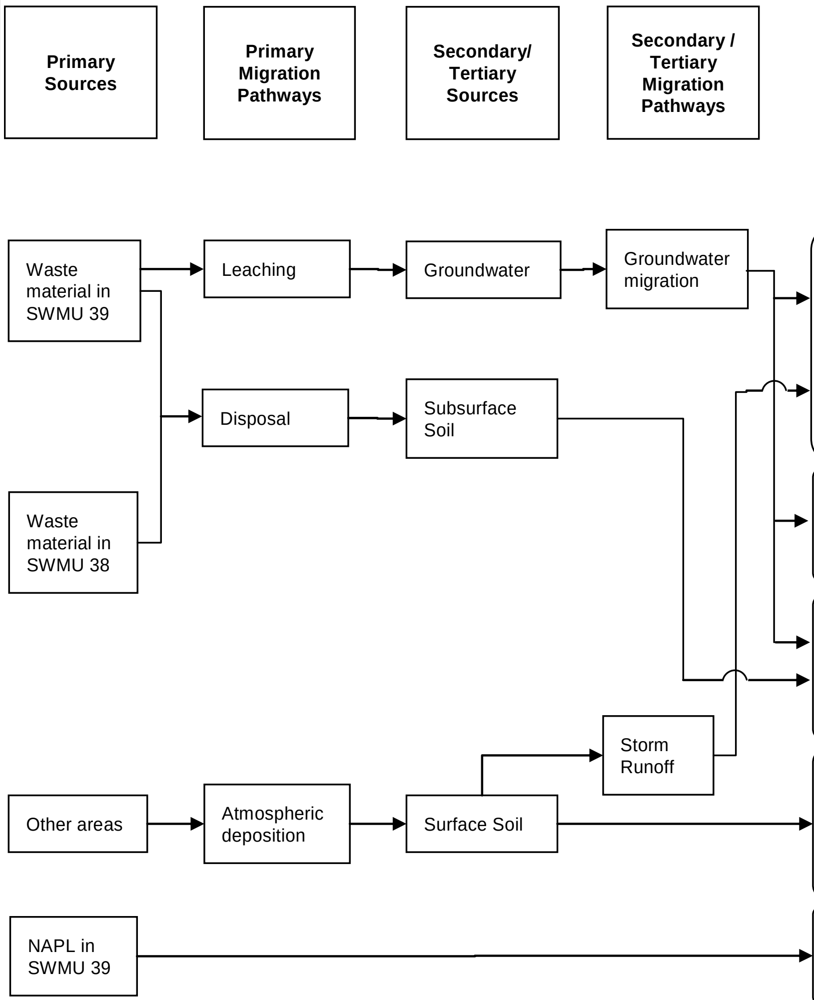


Exposure Media	Exposure Pathways	Human Health Receptors of Interest (ROIs)	Ecological ROIs		
		Recreational User	Invertebrates	Fish	Aquatic-Feeding Wildlife
Dicks Creek Floodplain Soil	Direct contact with soil	✓			✓
	Soil ingestion	✓			✓
	Inhalation of airborne particulates	✓			✓
	Inhalation of soil vapors	✓			✓
	Prey ingestion				✓
Dicks Creek Surface Water Sediment	Direct contact with water	✓	✓	✓	✓
	Water ingestion	✓	✓	✓	✓
	Inhalation of water vapor	✓			
	Direct contact with sediment	✓	✓	✓	✓
	Sediment ingestion	✓	✓	✓	✓
	Fish/prey ingestion	✓	✓	✓	✓

✓ Potentially complete exposure pathway, currently and in the future

◆ Potentially complete exposure pathway in the future

Figure 21. Preliminary Site Conceptual Model for Dicks Creek, AK Steel Corporation, Middletown, Ohio

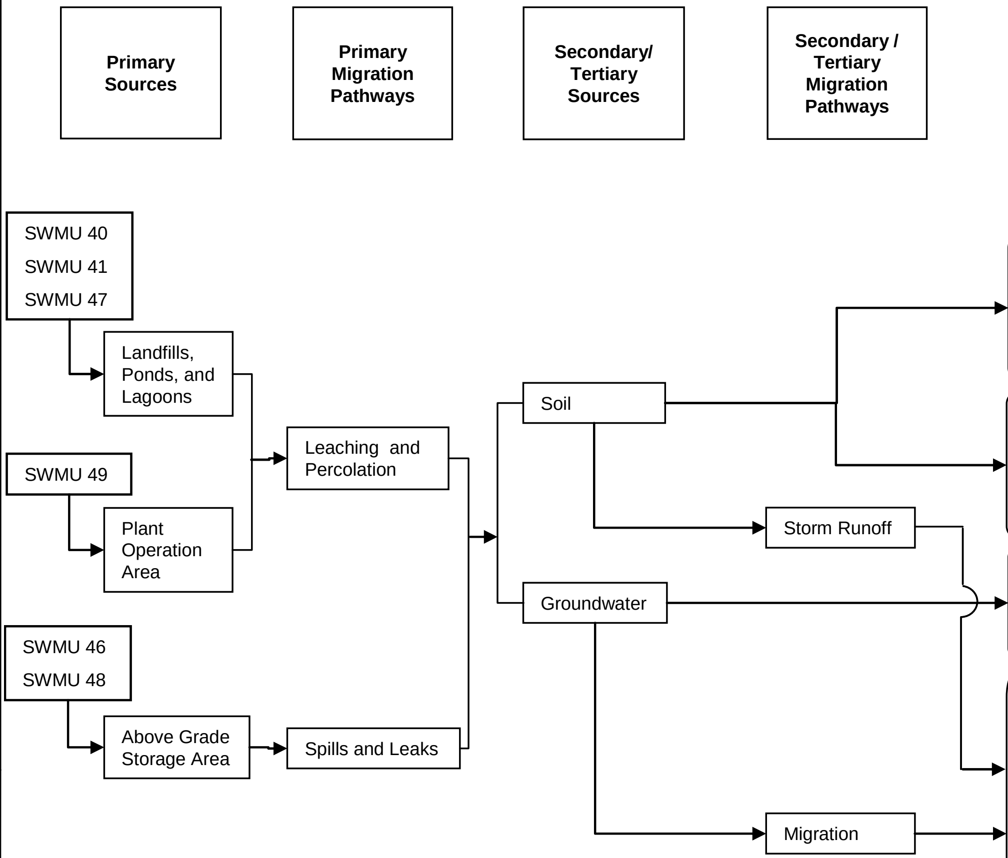


Exposure Media	Exposure Pathways	Onsite Receptors of Interest (ROIs)		Offsite ROIs	Ecological Receptors		
		Maintenance Worker	Trespasser	Resident	Invertebrates	Fish	Wildlife
Monroe Ditch Surface Water / Sediment	Direct contact with water	◆	✓		✓	✓	✓
	Water ingestion	◆	✓		✓	✓	✓
	Inhalation of water vapor	◆	✓				
	Direct contact with sediment	◆	✓		✓	✓	✓
	Sediment ingestion	◆	✓		✓	✓	✓
	Fish/Prey ingestion				✓	✓	✓
Groundwater/ Leachate	Dermal contact	◆		◆			
	Incidental ingestion	◆		◆			
	Inhalation of vapors	◆	✓	✓			
Subsurface Soil / Waste	Dermal contact	◆					
	Incidental ingestion	◆					
	Inhalation of airborne particulates	◆					
	Inhalation of soil vapors	◆	◆	✓			
Surface Soil	Dermal contact	◆	◆				
	Incidental ingestion	◆	◆				
	Inhalation of airborne particulates	◆	◆	✓			
	Inhalation of soil vapors	◆	◆	✓			
NAPL	Dermal contact	◆					
	Inhalation of vapors	◆					

✓ Potentially complete exposure pathway, currently and in the future
◆ Potentially complete exposure pathway in the future

SWMU 38: Closed Solid Waste Landfill by Yankee Road and Dicks Creek
SWMU 39: Closed CERCLA Notification Solid Waste Landfill

Figure 22. Preliminary Site Conceptual Model for SWMU 38/39, AK Steel Corporation, Middletown, Ohio

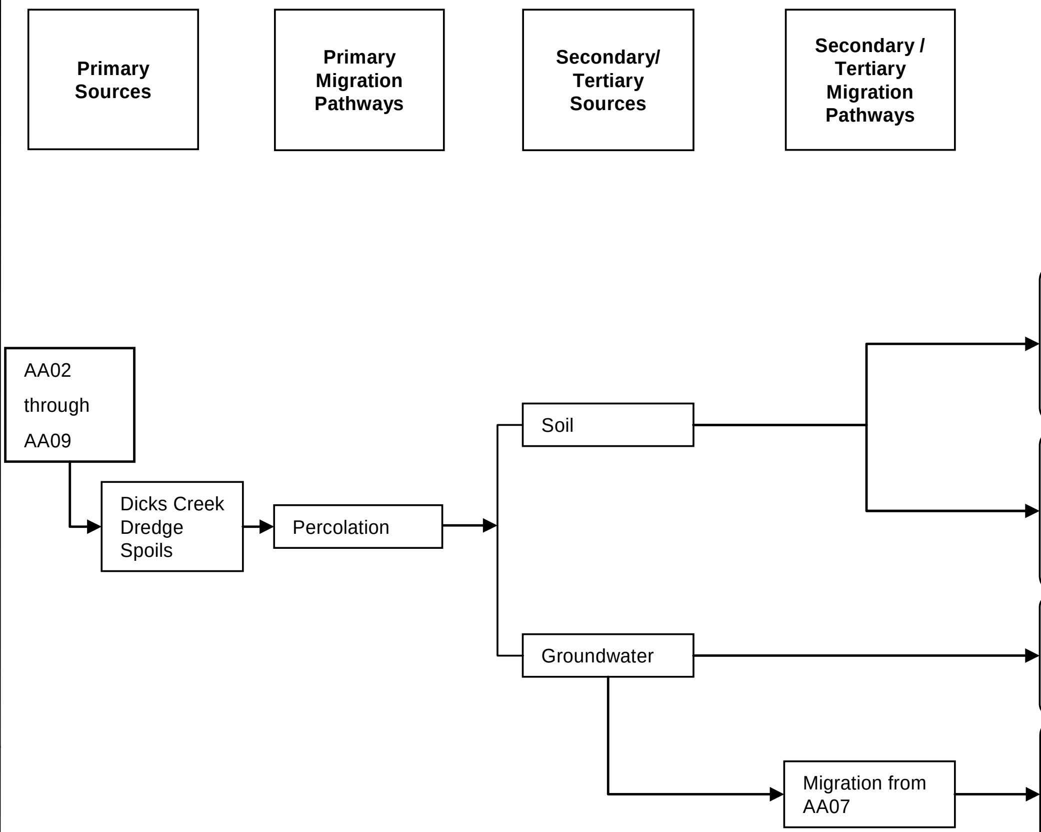


Exposure Media	Exposure Pathways	Onsite Receptors of Interest (ROIs): Maintenance Worker	Onsite ROIs: Routine Worker	Onsite ROIs: Trespasser	Offsite ROIs: Resident
Surface Soil	Dermal contact	◆	✓	✓	
	Incidental Ingestion	◆	✓	✓	
	Inhalation of airborne particulates	◆	✓	✓	✓
	Inhalation of soil vapors	◆	✓	✓	✓
Subsurface Soil	Dermal contact	◆			
	Incidental Ingestion	◆			
	Inhalation of airborne particulates	◆			
	Inhalation of soil vapors	◆	✓	✓	✓
Groundwater	Dermal contact	◆	✓		◆
	Ingestion	◆	✓		◆
	Inhalation of vapors	◆	✓	✓	✓
Monroe Ditch Surface Water / Sediment	Direct contact with water	◆		✓	
	Water ingestion	◆		✓	
	Inhalation of water vapor	◆		✓	
	Direct contact with sediment	◆		✓	
	Sediment ingestion	◆		✓	
Dicks Creek Surface Water / Sediment	For exposure pathways and receptors, see Dicks Creek Conceptual Site Model – Figure 21.				

SWMU 40: Closed Solid Waste Landfill on West Side of Slag Processing Area
SWMU 41: Closed Solid Waste Landfill West of Slag Processing Area Access Road
SWMU 46: Current Oil Storage Area
SWMU 47: Former Oil Separator Ponds and Vicinity
SWMU 48: Existing Fueling Area in SW Part of OMS
SWMU 49: Former Kish Quenching Area

✓ Potentially complete exposure pathway, currently and in the future
◆ Potentially complete exposure pathway in the future

Figure 23. Preliminary Site Conceptual Model for the Slag Processing Area, AK Steel Corporation, Middletown, Ohio.



Exposure Media	Exposure Pathways	Offsite ROIs: Maintenance Worker	Offsite ROIs: Routine Worker	Offsite ROIs: Resident
Surface Soil	Dermal contact	✓	✓	✓
	Incidental Ingestion	✓	✓	✓
	Inhalation of airborne particulates	✓	✓	✓
	Inhalation of soil vapors	✓	✓	✓
Subsurface Soil	Dermal contact	✓		
	Incidental Ingestion	✓		
	Inhalation of airborne particulates	✓		
	Inhalation of soil vapors	✓	✓	✓
Groundwater	Dermal contact	◆	◆	◆
	Ingestion	◆	◆	◆
	Inhalation of vapors[a]	◆	◆	◆ /✓
Dicks Creek Surface Water ⇄ Sediment	For exposure pathways and receptors, see Dicks Creek Conceptual Site Model – Figure 21.			

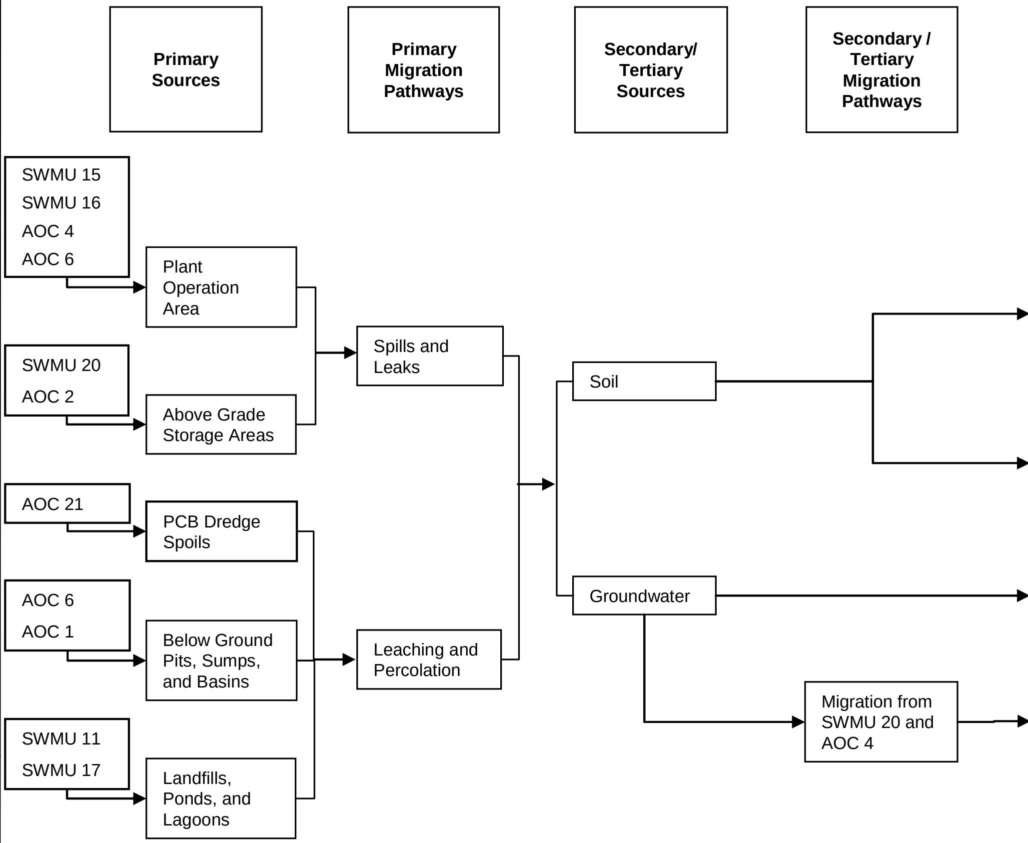
AA02: Former Glenn Cartage Property
AA03: Thomas Sturgell Property
AA04: Back Half of Properties between Glenn Cartage and Sturgell Properties
AA05: Old Armco Lot NS DC, North of Big Meander
AA06: Former Burridge Machine Shop Property, NS DC
AA07: Former Cecil Osburn Lot (Stations 12-18)
AA08: Pipeline Fill Area (Stations 32-36)
AA09: Orman's Welding Property

✓ Potentially complete exposure pathway, currently and in the future

◆ Potentially complete exposure pathway in the future

a. Inhalation of vapors is considered a potential future pathway for groundwater within the Additional Areas and a potential current pathway for on-site groundwater (due to air dispersion).

Figure 24. Preliminary Site Conceptual Model for Additional Areas, AK Steel Corporation, Middletown, Ohio.



Exposure Media	Exposure Pathways	Onsite Receptors of Interest (ROIs)			Offsite ROIs
		Maintenance Worker	Routine Worker	Trespasser	Resident
Surface Soil	Dermal contact	◆	✓	✓	
	Incidental Ingestion	◆	✓	✓	
	Inhalation of airborne particulates	◆	✓	✓	✓
	Inhalation of soil vapors	◆	✓	✓	✓
Subsurface Soil	Dermal contact	◆			
	Incidental Ingestion	◆			
	Inhalation of airborne particulates	◆			
	Inhalation of soil vapors	◆	✓	✓	✓
Groundwater	Dermal contact	◆	✓		◆
	Ingestion	◆	✓		◆
	Inhalation of vapors	◆	✓	✓	✓
Dicks Creek Surface Water Sediment	For exposure pathways and receptors, see Dicks Creek Conceptual Site Model – Figure 21.				

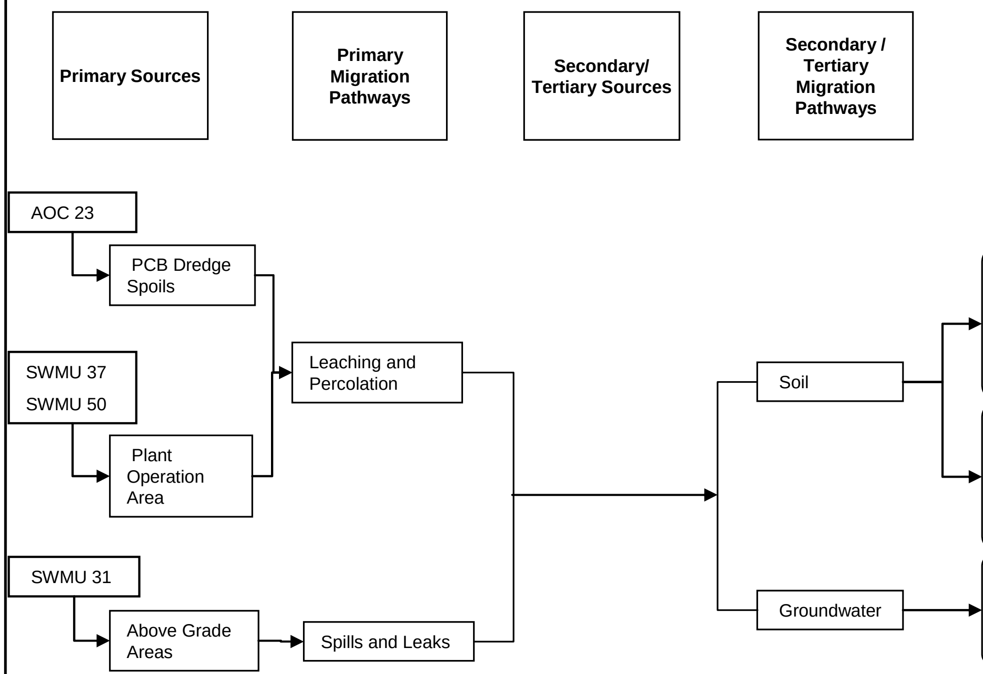
✓ Potentially complete exposure pathway, currently and in the future

◆ Potentially complete exposure pathway in the future

SWMU 11: Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds
SWMU 15: Former Coal Tar Decanter Sludge Recycling Area
SWMU 16: Former Coal Tar Decanter Sludge Collection Bin
SWMU 17: Northern Section of Former Tar Lagoon (Near Robin Hood Coal Pile)
SWMU 20: Former Benzol Tank Farm Area (including Tar Tank Sludge Storage Area)

AOC 1: Coke Quenching Water Collection Plant
AOC 2: Tar Tanks
AOC 4: Former Rail Car Transfer Area
AOC 6: Stormwater Sump and Release Areas
AOC 21: Dredge Spoil Fill Area near Oxford State Road and North Branch of Dicks Creek

Figure 25. Preliminary Site Conceptual Model for the Melt Plant Area, AK Steel Corporation, Middletown, Ohio.



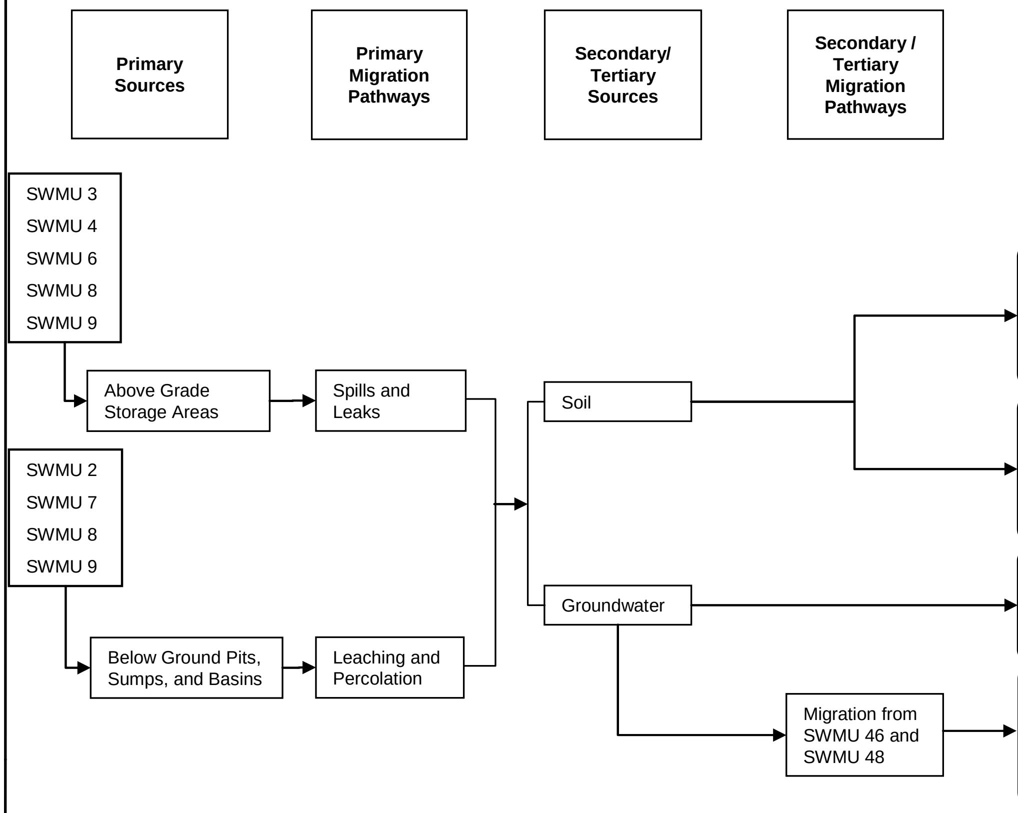
Exposure Media	Exposure Pathways	Onsite Receptors of Interest (ROIs)			Offsite ROIs
		Maintenance Worker	Routine Worker	Trespasser	Resident
Surface Soil	Dermal contact	◆	✓	✓	
	Soil Ingestion	◆	✓	✓	
	Inhalation of airborne particulates	◆	✓	✓	✓
	Inhalation of soil vapors	◆	✓	✓	✓
Subsurface Soil	Dermal contact	◆			
	Incidental Ingestion	◆			
	Inhalation of airborne particulates	◆			
	Inhalation of soil vapors	◆	✓	✓	✓
Groundwater	Dermal contact	◆	✓		◆
	Ingestion	◆	✓		◆
	Inhalation of vapors	◆	✓	✓	✓

✓ Potentially complete exposure pathway, currently and in the future

◆ Potentially complete exposure pathway in the future

SWMU 31: South Terminal Used Oil Recovery Facility
SWMU 37: Solid Waste Transfer Area
SWMU 50: Former Slag Processing Area
AOC 23: Dredge Spoil Fill Area – near Oxford State Road and North Branch of Dicks Creek

Figure 26. Preliminary Site Conceptual Model for the South Plant Area, AK Steel Corporation, Middletown, Ohio.



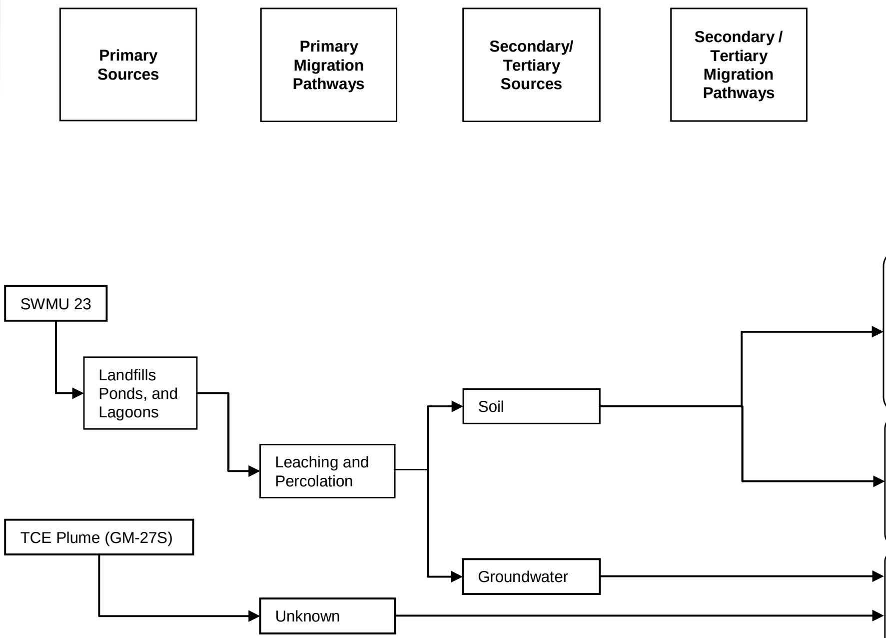
Exposure Media	Exposure Pathways	Onsite Receptors of Interest (ROIs)			Offsite ROIs
		Maintenance Worker	Routine Worker	Trespasser	Resident
Surface Soil	Dermal contact	◆	✓	✓	
	Incidental Ingestion	◆	✓	✓	
	Inhalation of airborne particulates	◆	✓	✓	✓
	Inhalation of soil vapors	◆	✓	✓	✓
Subsurface Soil	Dermal contact	◆			
	Incidental Ingestion	◆			
	Inhalation of airborne particulates	◆			
	Inhalation of soil vapors	◆	✓	✓	✓
Groundwater	Dermal contact	◆	✓		◆
	Ingestion	◆	✓		◆
	Inhalation of vapors	◆	✓	✓	✓
Dicks Creek Surface Water Sediment	For exposure pathways and receptors, see Dicks Creek Conceptual Site Model – Figure 21.				

✓ Potentially complete exposure pathway, currently and in the future

◆ Potentially complete exposure pathway in the future

SWMU 2: North Terminal WWTP Concentrator Pit
SWMU 3: Terne Coat Flux Hazardous Waste Storage Area
SWMU 4: Terne Coat Dross Bucket Storage Area
SWMU 6: PCB Storage Area (Door 7)
SWMU 7: Former Used Oil Reclamation Facility (Door 55A)
SWMU 8: Used Oil Reclamation Facility Number 2
SWMU 9: Former Used Oil Reclamation Facility Number 3 (Door 179A)

Figure 27. Preliminary Site Conceptual Model for the North Plant Area, AK Steel Corporation, Middletown, Ohio.



Exposure Media	Exposure Pathways	Onsite Receptors of Interest (ROIs)			Offsite ROIs	Ecological ROIs		
		Maintenance Worker	Routine Worker	Trespasser	Resident	Soil Invertebrates	Plants	Terrestrial Wildlife
Surface Soil	Dermal contact	◆	✓	✓		✓	✓	
	Incidental Ingestion	◆	✓	✓		✓		✓
	Inhalation of airborne particulates	◆	✓	✓	✓			
	Inhalation of soil vapors	◆	✓	✓	✓			
	Prey Ingestion					✓		✓
Subsurface Soil	Dermal contact	◆						
	Incidental Ingestion	◆						
	Inhalation of airborne particulates	◆						
	Inhalation of soil vapors	◆	✓	✓	✓			
Groundwater	Dermal contact	◆	✓		◆			
	Ingestion	◆	✓		◆			
	Inhalation of vapors	◆	✓	✓	✓			

✓ Potentially complete exposure pathway, currently and in the future

◆ Potentially complete exposure pathway in the future

SWMU 23: Former Coil Paint Wastewater Treatment Lagoons
TCE Plume (GM-27S)

Figure 28. Preliminary Site Conceptual Model for Miscellaneous Areas, AK Steel Corporation, Middletown, Ohio.

ARCADIS

Appendix A

SWMU/HWMU/AOC/AA-Specific Data

ARCADIS

North Plant Area

SWMU 1 – North Terminal Wastewater Treatment Plant (WWTP)

UNIT DESCRIPTION: The North Terminal Wastewater Treatment Plant also known as the North Terminal Treatment Plant (NTTP) receives wastewater from the Air Products Facility and the North Plant Area including the North Terminal WWTP Concentrator Pit (SWMU 2). Historically the NTTP received wastewater from the former Coil Paint Area. Treated effluent is discharged through internal Outfall 614 and external Outfall 011 to the Great Miami River. The main component of the NTTP is the two clarifiers. Two lime bins, two rapid mix tanks, two neutralization tanks, two aeration tanks, two flocculator tanks, two surge tanks, two acid mix basin sumps are also included in the NTTP. Wastewater collected in the North Terminal Wastewater Treatment Concentrator Pit (SWMU 2) is treated at the NTTP. Vacuum filters dewater sludge which is currently transferred off-site for disposal, while historically this sludge was disposed of in onsite landfills. During the PR/VSI a portable filter press was used for dewatering sludge at the NTTP. Currently the NTTP is operating at a significantly diminished capacity compared to the original design capacity of 1,750 gallons per minute. Only one primary clarifier operates on a daily basis, while the other clarifier is reserved for emergency or times when the primary clarifier is undergoing maintenance.

MATERIALS MANAGED: Wastewater was historically received from the Number 1 and 3 Zinc Grip Line, Number 1 Boiler House Fume Scrubber, Number 2 Terne Coat Line, Number 1 Paint Grip Line, Number 1, 2, and 3 Pickers, Number 5 and 6 Temper Mills, Number 1 and 2 Cold Mill, Strip Normalizer Line, Clean and Rewind Line, Roll Shops, and Used-Oil Reclamation Facilities (SWMUs 7, 8, and 9). Currently the NTTP receives wastewater from the concentrator pit, the Air Products facility, and Number 3 Zinc Grip. Spent Pickle Liquor (SPL) is trucked from the South Terminal Treatment Plant (SWMU 28) to the NTTP approximately several times per week. Wastewater is mixed with SPL (iron for co-precipitation, and free acidity for oil emulsion-breaking) and then treated with lime for neutralization. After processing, wastewater is discharged through internal Outfall 614 and external Outfall 011. Currently the NTTP handles approximately 210 gallons per minute with a large percentage of the water coming from the Air Products facility which is predominately non-contact cooling tower blowdown.

LOCATION: The NTTP is located in the southwestern portion of the North Plant Area.

PERIOD OF OPERATION: The original plant was built in the 1950s and treated wastewaters from the former Hot Strip Mill. In the mid-1970s, the Hot Strip Mill WWTP was converted to the NTTP. In 1979 the plant was designed to handle 1,750 gallons per minute with 1,000 gallons per minute coming from the No. 1 Boiler House stack fume scrubber. The plant was modified in 1990 when AK Steel added a caustic feed system so they could meet permit requirements in emergency situations. The caustic tank is no longer in use and has been cleaned out.

CURRENT WASTE MANAGEMENT DESCRIPTION: The NTTP receives and treats wastewaters from several sources including the Wastewater Treatment Concentrator Pit (SWMU 2). Various reagents such as flocculants, coagulants, and lime are added to enhance treatment. Current TCLP results from the NTTP filter sludge indicated the sludge is characterized as non-hazardous. Dewatered sludge from the vacuum filters was historically transported to AK Steel landfills in the Slag Processing Area. Currently the sludge is transferred off-site for landfill disposal. Addition of SPL as a reagent in the treatment process is the source for metals and acidity in this waste stream.

ENGINEERED CONTROLS: The NTTP Clarifiers are located on concrete pads. The Vacuum Filters and Lime Bins are located inside the building and dewatered sludge is loaded onto trucks under a canopy. The truck loading area is surrounded by concrete.

DESCRIPTION OF RELEASES: There have been no documented releases associated with the NTTP. There are at least two documented occurrences of pH deviations from the NPDES permit limits. On

December 4, 1989 a SPL discharge created a pH of 1 to 3 at Outfall 614. On August 22, 1990 a line rupture from the terne coat area discharged approximately 5,000 gallons of waste acid to the NTTP which created an upset condition. During this event pH ranged from 3 to 6 and while these readings were below the NPDES limitations the combined effluent stream at Outfall 011 exhibited a pH of 7.4.

PREVIOUS INVESTIGATIONS: There have been no previous investigations at the NTTP.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

AK Steel Drawing Number 582804, “Process and Instrumentation Diagram – Collection System”, November 11, 1977.

AK Steel Drawing Number 582801, “Outfall Discharge Program”, May 23, 1975.

AK Steel Drawing Number 582802, “Outfall Discharger Program”, May 23, 1975.

AK Steel Drawing Number 582812, “Water Treatment Facility”, May 23, 1975.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the US Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Encoss proposal to AK Steel, “Optimization Potential for the North Terminal Treatment Plant”, April 2004.

Gallo, Patrick, AK Steel, Letter to Steve Martin, Ohio EPA, Southwest District Office. August 27, 1990.

Green, Holly, Belmont Labs, Letter to Jim Kemp, AK Steel, “RE: Waste Characterization.” July 25, 2006.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the US Environmental Protection Agency. December 11, 1992.

ARCADIS

SWMU 2 – North Terminal WWTP Concentrator Pit

UNIT DESCRIPTION: The North Terminal Wastewater Treatment Plant (NTTP) Concentrator Pit collects wastewaters that are eventually transferred to the NTTP (SWMU 1) for treatment via two pumps. The Concentrator Pit was historically used as a scale pit for various steel products being manufactured in the North Plant Area. The Concentrator Pit is a sub-grade reinforced concrete structure. It is approximately 96 feet long, 32 feet wide, and 22 feet deep with the long axis running east-west. A series of internal concrete baffles regulate the incoming wastewater.

MATERIALS MANAGED: Originally the Concentrator Pit was designed as a scale pit for the former Hot Strip Mill in the North Plant. Currently, the Concentrator Pit accepts wastewater from sources throughout the Plant. Miscellaneous mill wastewaters are transported via vacuum truck and stormwater run-off are currently the primary components of the wastewater handled in the Concentrator Pit. The most recent sampling event (July 2009) of this dewatered sludge indicates that the waste is characterized as non-hazardous.

LOCATION: The Concentrator Pit is located in the central portion of the North Plant Area adjacent to the NTTP.

PERIOD OF OPERATION: It is unclear the date that the Concentrator Pit was constructed; however, it was observed in the 1956 aerial photograph with the NTTP (SWMU 1).

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently the Concentrator Pit intermittently pumps approximately 1,000 gallons per minute directly to the NTTP. This occurs on a very infrequent basis and is discharged based on an automatic level control system. The wastewater received now is predominantly from vacuum trucks and stormwater run-off. During periods of heavy rainfall the Concentrator Pit will handle large volumes of run-off over a 24-hour period.

ENGINEERED CONTROLS: The Concentrator Pit is constructed of reinforced concrete.

DESCRIPTION OF RELEASES: No releases from the Concentrator Pit have been documented.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred at the Concentrator Pit.

DATA GAPS: The release potential into the environment, due to the unknown integrity of the concrete basin is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number C-32500, “Plot Layout of Mill Scale Water Clarification System”, April 14, 1954.

AK Steel Drawing Number 32544, “Water Clarification System, Pump Station Foundation Details”, September 29, 1954.

AK Steel Drawing Number 32541, “Water Clarification System, Foundation Sections”, October 6, 1954.

AK Steel Drawing Number C-36881, “Mill Scale Concentrator Foundation Plan and Wall Details”, June 4, 1957.

AK Steel Drawing Number C-36882, “Mill Scale Concentrator Foundation Plan and Wall Details”, June 7, 1957.

AK Steel Drawing Number 582801, “Outfall Discharge Program”, May 23, 1975.

AK Steel Drawing Number 582802, “Outfall Discharger Program”, May 23, 1975.

AK Steel Drawing Number 582812, “Water Treatment Facility”, May 23, 1975.

AK Steel Drawing Number 58287, “Water Pollution Abatement, Concentrator and Pump House Area”, July 5, 1977.

AK Steel Drawing Number 582804, “Process and Instrumentation Diagram – Collection System”, November 11, 1977.

AK Drawing Number 584821, “Concentrator and Pump House Area Marlow Pumps and Piping Addition”, July 1985.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

Waste Characterization; Order Number 09G1075, Belmont Labs, July 21, 2009.

SWMU 3 – Terne Coat Flux Hazardous Waste Storage Area

UNIT DESCRIPTION: The former Terne Coat Flux Hazardous Waste Storage Area was located inside the buildings housing the Number 2 Terne Coat line. This area stored 55-gallons drums of terne flux skimmings for less than 90 days. The storage area was approximately 24 feet long by 8 feet wide. The storage area was located in the vicinity of the former Terne Coat Line in the northern end of building number 5317. Currently, this area is used for less than 90 day storage of other hazardous wastes.

MATERIALS MANAGED: Terne flux skimmings were EPA listed for lead (D008) and cadmium (D006) were stored in this area in 55-gallon drums. This area was subject to RCRA regulations 40 CFR 262.34 (a). The protocol for handling of the terne flux skimmings included placing placards indicating “hazardous waste” and “corrosive” and including the date on all 55-gallon drums. The 55-gallon drums were also covered with soda ash to fixate any potential free liquid. After the accumulation of approximately 30 drums, disposal was arranged prior to 90 days of storage. During the Preliminary Review/Visual Site Inspection (PR/VSI) visit in 1991, twenty-two drums were stored within this area.

LOCATION: The Terne Coat Flux Hazardous Waste Storage Area is located in the extreme northwestern end of building number 5317. Building number 5317 is located in the north-central portion of the North Plant Area.

PERIOD OF OPERATION: AK Steel began accumulating drums within the Terne Coat Flux Hazardous Waste Storage Area sometime after the No. 1 Terne Coat Line was decommissioned. The No. 1 Terne Coat Line operated from approximately 1940 until the early 1970s. The No. 2 Terne Coat Line was decommissioned in 2002. Since 2002, the area has been used for less than 90 day drum storage.

CURRENT WASTE MANAGEMENT DESCRIPTION: Terne coat flux skimmings are no longer managed in this area. Currently this area is used as a less than 90 day hazardous waste storage area. During the 2006 CCR site visit, the area housed 55-gallon drums until they were disposed of off-site. The drums are stored in this area for no more than 90 days. Primary wastes stored in this area include drums of waste ink, waste ink rags, waste lead debris, lead contaminated spent HEPA filters, waste surface treatment chemical absorbents, sand blast grit, lead paint, lab packs, and spent lead contaminated personal protective equipment (PPE). Weekly inspections of the current storage area are conducted by plant personnel.

ENGINEERED CONTROLS: Employees working with terne coat flux skimmings at AK Steel were provided documentation and training as required by EPA regulations for personnel who handle or manage hazardous wastes. Protocol indicates weekly inspections were performed on the Terne Coat Flux Hazardous Waste Storage Area. Any terne flux skimming that was spilled was to be confined to as small an area as possible and have absorbent material (e.g. Speedi-dry) applied as necessary. All spilled and contaminated material was to be transferred to a clean 55-gallon drum and covered with lime or soda ash. Currently, weekly inspections continue to be conducted at the less than 90 day hazardous waste storage area to ensure the drums stored are in good repair. A 4-inch berm partially surrounds the area and could act locally as secondary containment. Furthermore, the area is inside a building and partitioned off by a chain-linked fence with a sign indicating “Hazardous Waste Storage Area”.

DESCRIPTION OF RELEASES: Ohio EPA noted spillage from a drum containing terne coat flux skimmings in the storage area in 1989. AK Steel cleaned the spillage upon notification. Floor staining was noted during the VSI in 1991, which would suggest past spills of terne coat flux skimmings. The properties of terne flux skimmings are a liquid when hot then transforms into a solid when cool; therefore, a release potential into the subsurface is very low.

PREVIOUS INVESTIGATIONS: There have not been any previous investigations at the Terne Coat Flux Hazardous Waste Storage Area.

DATA GAPS: The release potential into the environment, due to the unknown integrity of the concrete floor is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number C-17333, “Galvanizing BLDG Extension, Structural Steel Design”, March 25, 1940.

AK Steel Drawing Number C-17349, “Galvanizing BLDG Extension, Architectural Details”, April 4, 1940.

AK Steel Drawing Number C-17359, “Galvanizing BLDG Extension, Building and Stack Foundations”, April 12, 1940.

AK Steel Drawing Number C-17511, “Coil Terne Coat Line, Foundations Plant Sheet #1”, March 23, 1940.

AK Steel Drawing Number C-17512, “Coil Terne Coat Line, Foundations Plant Sheet #2”, March 23, 1940.

AK Steel Drawing Number C-45834, “Coating #2 Terne Coat, General Arrangement”, February 16, 1962.

AK Steel Drawing Number 517511, “Coil Terne Coat Line, Machine Foundations”, October 15, 1968.

AK Steel Drawing Number 517512, “Coil Terne Coat Line, Machine Foundations”, October 30, 1968.

AK Steel Drawing Number 517513, “Coil Terne Coat Line, Machine Foundations”, November 6, 1968.

AK Steel Drawing Number 570499, “Number 1 Terne Coat Line, Foundation Plan”, December 20, 1968.

AK Steel Drawing Number 568687, “Number 1 Terne Coat Line, General Arrangement”, March, 1969.

AK Steel Drawing Number 572491, “Galvanizing BLDG, Detail Foundation Plan”, December 21, 1969.

AK Steel Corporation, Letter from Russell Dudek to Ernie Rummler, “Changes & Reinstruction for Terne Flux Skimming Handling and Storage Inspection.” January 24, 1990.

AK Steel Corporation, “INSTRUCTIONS FOR TERNE FLUX SKIMMINGS (TFS) HANDLING.” August 16, 1990.

AK Steel Corporation, Letter from Patrick Gallo to Ohio EPA; Spill Number 08-09-3358. April 28, 1993.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 4 – Terne Coat Dross Bucket Storage Area

UNIT DESCRIPTION: The Terne Coat Dross Bucket Storage Area is located inside the building housing the Terne Coat Line and adjacent to the Terne Coat Hazardous Waste Storage Area (SWMU 3). Steel dross buckets measuring approximately 10 feet long, 5 feet wide, and 2 feet deep were stored in this area. The buckets contained solidified chunks of dross generated during the terne coating operations. The practice of storing Terne Coat Dross Buckets was discontinued when the Number 2 Terne Coat Line was shut down in September 2002.

MATERIALS MANAGED: Dross was removed from the terne coating operation and allowed to cool in the storage area. Historically dross was stored in this area until it was shipped off-site for reclamation. Dross is a by-product of the terne coating operation that contains lead, which was reclaimed by an off-site facility.

LOCATION: The Terne Coat Dross Bucket Storage Area was located in the northern portion of building number 5317. Building number 5317 is located in the north-central portion of the North Plant Area.

PERIOD OF OPERATION: While it is unclear when AK Steel began accumulating dross the Number 2 Terne Coat line was in operation as early as 1960. Dross buckets are no longer stored in the Terne Coat Dross Bucket Storage Area. The unit is inactive.

CURRENT WASTE MANAGEMENT DESCRIPTION: There are no wastes currently managed in the Terne Coat Dross Bucket Storage Area.

ENGINEERED CONTROLS: When the unit was active, dross was stored in steel buckets on a concrete floor inside a building.

DESCRIPTION OF RELEASES: There are no documented releases related to the Terne Coat Dross Bucket Storage Area, and once cooled, dross is a solid making a release unlikely. During decommissioning solid residue and other left over materials were removed and disposed of. In addition, excess residue was skimmed off the floor and disposed off-site.

PREVIOUS INVESTIGATIONS: There have not been any previous investigations at the Terne Coat Dross Bucket Storage Area.

DATA GAPS: The release potential into the environment, due to the unknown integrity of the floor is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number C-17511, “Coil Terne Coat Line, Foundations Plant Sheet #1”, March 23, 1940.

AK Steel Drawing Number C-17512, “Coil Terne Coat Line, Foundations Plant Sheet #2”, March 23, 1940.

AK Steel Drawing Number C-17333, “Galvanizing BLDG Extension, Structural Steel Design”, March 25, 1940.

AK Steel Drawing Number C-17349, “Galvanizing BLDG Extension, Architectural Details”, April 4, 1940.

AK Steel Drawing Number C-17359, “Galvanizing BLDG Extension, Building and Stack Foundations”, April 12, 1940.

AK Steel Drawing Number 517511, “Coil Terne Coat Line, Machine Foundations”, October 15, 1968.

AK Steel Drawing Number 517512, “Coil Terne Coat Line, Machine Foundations”, October 30, 1968.

AK Steel Drawing Number 517513, “Coil Terne Coat Line, Machine Foundations”, November 6, 1968.

AK Steel Drawing Number 570499, “Number 1 Terne Coat Line, Foundation Plan”, December 20, 1968.

AK Steel Drawing Number 568687, “Number 1 Terne Coat Line, General Arrangement”, March 1969.

AK Steel Drawing Number 572491, “Galvanizing BLDG, Detail Foundation Plan”, December 21, 1969.

AK Steel Drawing Number C-45834, “Coating #2 Terne Coat, General Arrangement”, February 16, 1962.

AK Steel “Banked Air Emissions – AK – Middletown Works.”

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 5 – Terne Coat Satellite Accumulation Area

UNIT DESCRIPTION: The former Terne Coat Satellite Accumulation Area consisted of a single 55-gallon steel drum enclosed by the terne-flux-skimmings-drum-fill-station adjacent to the terne coating operation.

MATERIALS MANAGED: Terne flux skimmings were collected in a 55-gallon drum placed on a pallet at the filling station. Once full the skimmings in the drum were allowed to cool and soda ash was added to the drum as an absorbent. The drum was then sealed and transported to the Terne Coat Hazardous Waste Storage Area (SWMU 3) and eventually disposed of off-site. Approximately a half a drum was produced per day. Terne flux skimmings were EPA listed for lead (D008) and cadmium (D006).

LOCATION: The Terne Coat Satellite Accumulation Area was located in the central portion of building number 5317. Building number 5317 is located in the north-central portion of the North Plant Area.

PERIOD OF OPERATION: The Terne Coat Satellite Accumulation Area would have first been used when the Number 2 Terne Coat Unit was in operation in 1960. This area ceased to operate when the Number 2 Terne Coat Line was shut down in September 2002.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Terne Coat Satellite Accumulation Area was decommissioned when the Number 2 Terne Coat Line was shut down in September 2002. There are currently no wastes managed in this area.

ENGINEERED CONTROLS: Employees working with terne flux skimmings at AK Steel were provided documentation and training as required by EPA regulations for personnel who handle or manage hazardous wastes. Any terne flux skimming that was spilled was to be confined to as small an area as possible and have absorbent material (e.g. Speedi-dry) applied as necessary. All spilled and contaminated material was transferred to a clean 55-gallon drum and covered with lime or soda ash. The Satellite Accumulation Area was inside of a building and had a concrete floor.

DESCRIPTION OF RELEASES: There is no documentation of releases related to the Terne Coat Satellite Accumulation Area.

PREVIOUS INVESTIGATIONS: There have not been any previous investigations at the Terne Coat Satellite Accumulation Area.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

AK Steel Corporation; Letter from Russell Dudek to Ernie Rummler, “Changes & Reinstruction for Terne Flux Skimming Handling and Storage Inspection.” January 24, 1990.

AK Steel Corporation, “INSTRUCTIONS FOR TERNE FLUX SKIMMINGS (TFS) HANDLING.” August 16, 1990.

AK Steel Corporation, “Banked Air Emissions – AK – Middletown Works.”

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 6 – PCB Storage Area (Door 7)

UNIT DESCRIPTION: The former PCB Storage Area (Door 7) is located in Building number 5259 in the central portion of the North Plant Area. Decommissioned PCB-containing equipment and PCB-contaminated soils were managed in this area. The storage area consists of a rectangular concrete pad enclosed by a chain-link fence within a building. From 1998 through 2000, AK Steel removed and replaced PCB transformers from the plant.

MATERIALS MANAGED: Materials stored in the PCB storage area include decommissioned equipment such as capacitors and lighting ballasts and PCB-contaminated soils and debris collected from the Hot Strip Mill. In addition, used hydraulic fuel is stored within this area prior to disposal off-site. At the time of the Preliminary Review/Visual Site Inspection (PR/VSI) visit in 1991, PCB-containing equipment and soil from the cleanup of a leaking rectifier were being managed in the storage area. This includes approximately 15 drums of material in the storage area. Decommissioned equipment is regularly stored within the PCB Storage Area prior to disposal off-site.

LOCATION: PCB Storage Area (Door 7) is located in Building number 5259 in the central portion of the North Plant Area.

PERIOD OF OPERATION: AK Steel began storing PCB-containing materials within this area in the late 1970s. During the PR/VSI visit, it was noted that the storage area had been in use for several years. This unit has not been used since approximately 2000, when AK Steel disposed of all of its PCB contaminated equipment.

CURRENT WASTE MANAGEMENT DESCRIPTION: Decommissioned PCB-containing equipment, PCB-contaminated soils, and used hydraulic fluid were stored in the PCB Storage Area before off-site disposal is arranged.

ENGINEERED CONTROLS: The PCB Storage Area consists of a concrete pad enclosed in a chain-link fence. The concrete pad has approximately a two-foot concrete berm and a small sump is located at one corner of the pad. The area was clearly labeled with placards indicating the materials stored are PCB containing.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the PCB Storage Area and there was no evidence of any spills or leaks in this area during the PR/VSI visit.

PREVIOUS INVESTIGATIONS: There have not been any previous investigations at the PCB Storage Area.

DATA GAPS: The release potential into the environment, due to the management of PCB materials and presence of a sump in the storage area is considered a data gap.

INFORMATION SOURCES:

AK Steel Corporation, "Report on Inspection to Determine Compliance with the PCB Disposal and Marking Regulations." April 5, 1983.

AK Steel, Middletown Works, Engineering Report RES No. 1666MW. July 24, 1997.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 7 – Former Used Oil Reclamation Facility (Door 55A)

UNIT DESCRIPTION: The Former Used Oil Reclamation Facility Number 1 consisted of a below-grade concrete collection pit, three oil-water separator tanks, a reclaimed storage tank, and associated pumps and piping. The collection pit was approximately 10 to 12 feet deep. A control building housed the oil-water separator tanks, operators' station, and various maintenance and laboratory equipment. Former Door 55A was the site of the Former Used-Oil Reclamation facility and was located off the southwest corner of a current shipping warehouse, Building number 5406. An outdoor subgrade pit was associated with the Former Used Oil Reclamation Facility and was used as a collection basin for vacuum trucks.

MATERIALS MANAGED: The Former Used Oil Reclamation Facility Number 1 accepted used oil from cold mills. This material was then placed into the collection pits where large materials such as rags were physically separated from the oil. The oil was then pumped into the two in-series, oil-water separators located inside the adjacent building. Heat was applied to the tanks and emulsion breakers added to the oil to facilitate separation. Reclaimed oil was than gravity fed to the above ground storage tanks outside the building. The by-product of this process was oily-wastewater which was pumped to the North Terminal Wastewater Treatment Plant (SWMU 1). The reclaimed oil would be transferred to several large storage tanks located in the Melt Plant Area where it would be blended and used by the blast furnaces and boiler house.

LOCATION: The Former Used Oil Reclamation Facility Number 1 was located at the site of Former Door number 55A, which was located off the southwest corner of a current shipping warehouse, Building number 5406.

PERIOD OF OPERATION: The Former Used Oil Reclamation Facility Number 1 was built in the mid to late 1960s. The facility was decommissioned in 1994 and is no longer in use.

CURRENT WASTE MANAGEMENT DESCRIPTION: When the Former Used Oil Reclamation Facility Number 1 underwent decommissioning all of the associated structures were removed. Currently only vacant land is present in this area.

ENGINEERED CONTROLS: The portions of the Former Used Oil Reclamation Facility which were located inside the building were on a concrete slab floor. The subgrade collection pit was constructed of concrete.

DESCRIPTION OF RELEASES: There has been no documentation of any releases associated with the Former Used-Oil Reclamation Facility Number 1. There was no evidence of any releases from this facility observed during the Preliminary Review/Visual Site Inspection (PR/VSI) visit.

PREVIOUS INVESTIGATIONS: No previous investigations have been conducted at the Former Used Oil Reclamation Facility Number 1.

DATA GAPS: The release potential into the environment, due to the management of used oils in the area is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number C-48537, "Oil Recovery Filter, BLDG Foundation", May 14, 1964.

AK Steel Drawing Number G48988, "Interconnection Piping Plan, Oil Recovery BLDG to Storage Tank", May 18, 1964.

AK Steel Drawing Number 548909, “Equipment Lay-out and Piping Plan – Oil Recovery Building #1”, May 20, 1964.

AK Steel Drawing Number 584775, “Waste Oil Line from #3 to #1 Oil Recovery Outside Sump (From N. Cold Mill)”, November 23, 1981.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 8 – Used Oil Reclamation Facility Number 2

UNIT DESCRIPTION: The Used-Oil Reclamation Facility Number 2 is located in Building number 5465 (Door number 191B) in the central portion of the North Plant Area. This facility consists of three oil-water separator tanks, an oil skimmer pit, and an aboveground storage tank outside the building. This building also houses an operator's station and various maintenance equipment. Currently the facility temporarily stores used oils and oily-waters before being transferred to the South Terminal Used Oil Recovery Facility (SWMU 31) by vacuum truck.

MATERIALS MANAGED: Used oils and oily-waters are pumped from the Temper Mills (Building numbers 5436 and 5438) into the oil-water separator tanks. Heat was applied to the separator tanks and chemical coagulant was added to enhance the separation of suspended solids from the oils. The clarified oil was further treated by a partially below-grade skimmer outside of the building. Wastewater created during this process was sent to the North Terminal Wastewater Treatment Plant (SWMU 1). The reclaimed oil is pumped to an above-ground recovery tank adjacent to the skimmer. The reclaimed oil is transported via truck to the coke plant, where historically the oil was sprayed onto coal being charged to the coke batteries for bulk density control. Currently, oily wastewater is temporarily stored and transported via truck to the South Terminal Used Oil Recovery Facility (SWMU 31) for processing.

LOCATION: The former Used Oil Reclamation Facility Number 2 is located in building number 5465 (Door number 191B) in the central portion of the North Plant Area.

PERIOD OF OPERATION: The Used Oil Reclamation Facility Number 2 was built in the mid-to-late 1960s. In the mid-1990s the facility began temporarily storing used oils and oily-waters until they are transported via truck to the South Terminal Used Oil Recovery Facility (SWMU 31).

CURRENT WASTE MANAGEMENT DESCRIPTION: The Used Oil Reclamation Facility Number 2 receives used oils from the adjacent Temper Mills (Building numbers 5436 and 5438) in the North Plant Area. These used-oils result from leaks and once-through lubricating oils. These used oils were then transferred to the South Terminal Used Oil Recovery Facility (SWMU 31) for oil reclamation.

ENGINEERED CONTROLS: The portions of the Used Oil Reclamation Facility Number 2 which is located inside the building are on a concrete slab floor.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Used-Oil Reclamation Facility Number 2. During the Preliminary Review/Visual Site Inspection (PR/VSI), there was no evidence of any releases having occurred from this facility.

PREVIOUS INVESTIGATIONS: There have been no previous investigations into the Used Oil Reclamation Facility Number 2.

DATA GAPS: The release potential into the environment, due to the management of used oils in the area is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number C-48536, "Oil Recovery, Pit-Filter BLDG", April 23, 1964.

AK Steel Drawing Number C-449074, "General Arrangement of Oil Recovery Building", August 6, 1964.

AK Steel Drawing Number 582810, "Water Pollution Abatement, New Process Sewers", May 23, 1975.

AK Steel Drawing Number 582845, “Outfall Discharge Program”, December 9, 1977.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 9 – Former Used Oil Reclamation Facility Number 3 (Door 179A)

UNIT DESCRIPTION: The Former Used Oil Reclamation Facility Number 3 (Door 179A) was located in the eastern portion of the North Plant, just southeast of the Annealing Building (Building Number 5396 – Door 179). This former facility consisted of three oil-water separator tanks located inside a control building, a concrete collection pit and an above-ground, horizontally-mounted oil storage tank outside the building. The facility is similar in design to Former Used Oil Reclamation Facility Number 1 (SWMU 7).

MATERIALS MANAGED: Before decommissioning in 1994 the Former Used Oil Reclamation Facility Number 3 accepted used oil into a collection pit via tank trucks. Large debris was then physically filtered out through the use of a metal mesh strainer located in the pit. The oil was pumped into the oil-water separators located inside the building where heat was applied and emulsion breakers added to the oil to enhance separation. Reclaimed oil was gravity-fed into the above-ground storage tank located outside the building. Reclaimed oil was then blended and reused as fuel within the Middletown Works.

LOCATION: The Former Used Oil Reclamation Facility Number 3 (Door 179A) was located in the eastern portion of the North Plant, just southeast of the Annealing Building (Building Number 5396 – Door 179).

PERIOD OF OPERATION: The Former Used Oil Reclamation Facility Number 3 was built in the early 1970s and was decommissioned in 1994. During the PR/VSI the above-ground storage tank was empty and the collection pit contained mostly water from precipitation.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Former Used Oil Reclamation Facility Number 3 is no longer active and has been demolished.

ENGINEERED CONTROLS: The portions of the Former Used-Oil Reclamation Facility Number 3 which were located inside the building were on a concrete slab floor.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Former Used Oil Reclamation Facility Number 3. During the Preliminary Review/Visual Site Inspection (PR/VSI) there was no evidence of any releases having occurred from this facility.

PREVIOUS INVESTIGATIONS: There have been no previous investigations at the Former Used Oil Reclamation Facility Number 3. A site assessment was performed in the vicinity of the Former Used Oil Reclamation Facility Number 3 in August 1993. This site assessment focused on three former underground storage tanks located at the southeast corner of the Annealing Building (Building Number 5396 – Door 179). The tank pit consisted of two 17,500 and one 11,800-gallon rolling, lubricating, and hydraulic oil tanks. Two soil borings were completed to assess the conditions downgradient (southeast) from the tanks. In addition, monitoring well GM-24S was sampled to determine any possible groundwater impacts. Analytical results for total petroleum (TPH) hydrocarbons for the soil samples submitted from the borings indicated no detections. There were no detections for TPH in the groundwater sample collected from monitoring well GM-24S.

DATA GAPS: The release potential into the environment, due to the management of used oils in the area is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number 584775, "Waste Oil Line from #3 to #1 Oil Recovery Outside Sump (From N. Cold Mill)", November 23, 1981.

Geraghty and Miller, Inc., “Site Assessment, Former Underground Storage Tanks North Cold Strip Mill Area, ARMCO Middletown Works, Middletown, Ohio”. August 1993.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

Melt Plant Area

SWMU 10 – Dorr Thickener and East Aboveground Tank

UNIT DESCRIPTION: The Dorr Thickener was built in 1952 and consists of a 25-foot high concrete aboveground structure that receives gas scrubbing wastewater from the blast furnace scrubber. The aboveground tank is the overflow containment for the Dorr Thickener. When water reaches the aboveground tank, it is pumped to air cooling towers and recycled back to the blast furnace scrubber. Underflow from the Dorr Thickener is pumped into the Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds (SWMU 11).

MATERIALS MANAGED: Wastewater generated from the collection of gas scrubbing wastewater and condensate from the gas scrubber at the Blast Furnace is collected in the Dorr Thickener. Overflow of this wastewater is captured in the East Aboveground Tank.

LOCATION: The Dorr Thickener and East Aboveground Tank are located in the northwestern portion of the melt area, located at AK Steel building number 5151.

PERIOD OF OPERATION: The Dorr Thickener and East Aboveground Tank were built in 1952 and are still in operation.

CURRENT WASTE MANAGEMENT DESCRIPTION: Wastewater collected from the Blast Furnace gas cleaning system is collected at the Dorr Thickener and East Aboveground Tank. Annual waste characterization samples are collected for off-site disposal from the Blast Furnace Pond dewatered sludge. The most recent sampling event (July 2009) of this dewatered sludge indicates that the waste is characterized as non-hazardous.

ENGINEERED CONTROLS: The Dorr Thickener is and aboveground reinforced concrete structure. Any overflows are collected in the East Aboveground Tank.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Dorr Thickener and East Aboveground Tank. During the Preliminary Review/Visual Site Inspection (PR/VSI), and the CCR site visits no releases or spills were observed from the system.

PREVIOUS INVESTIGATIONS: No previous investigations have been associated with the Dorr Thickener or East Aboveground Tank.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel Drawing Number BC-3271, "Middletown Blast Furnace, Dorr Thickener", December 1, 1958.

AK Steel Drawing Number 565242, "Overhead 6" Sludge Pipe Support from Pump House to Sludge Pond", July 11, 1984.

AK Steel Drawing Number 705274, "Blast Furnace #3, Dorr Thickener, Piping Plan and Sections", February 2, 1998.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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SWMU 11 – Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds

UNIT DESCRIPTION: The Blast Furnace/Sinter Plant Waste Water Treatment Sludge Ponds is comprised of two ponds (north and south sludge ponds). Wastewater created from the Melt Plant operations is received into these ponds. During the Preliminary Review/Visual Site Inspection (PR/VSI) visit and the CCR site visit (May 2006) the ponds were purported to be clay lined. However, documents prepared during the construction of the ponds appear to indicate native soil beneath the ponds and it is unclear as to what the native soil is in the vicinity. Currently, one pond is operating and is dredged on a daily basis; the other pond is used on an emergency basis. Between the two ponds 7-gauge sheet piling has been installed to form the edges of the ponds and an access road is present between them. In 1952 when the ponds were created a third pond was constructed west of the south sludge pond, it was labeled the “Backwash Sludge Pond”. During construction the ponds were approximately 60 feet wide and 310 feet long. According to plant diagrams the maximum water level in the ponds is 8 feet deep. Each of the ponds has a 1:1.5 graded slope. In 1974 the backwash sludge pond was incorporated into the south sludge pond to add an additional 70 feet in length. Wastewater is gravity fed into the sludge ponds from the water softener system and pumped from the Blast Furnace. Historically, wastewater was also pumped into the ponds from the former Sinter Plant, which was taken out of service in June 2003. Water managed in the ponds is treated at the Blast Furnace/Sinter Plant Wastewater Treatment Plant (SWMU 12), and is eventually discharged to internal Outfall 613 and external Outfall 011 under AK Steel’s NPDES permit.

MATERIALS MANAGED: The ponds receive wastewater from the blast furnace and the former sinter plant scrubbers, and the water softener system. Sources of the wastewater include underflow from the Dorr Thickener; Blast Furnace cast house floor, water softener clarifier underflow, and the former Venturi Scrubber in the Sinter Plant. According to the PR/VSI, AK Steel conducted EP toxicity tests in 1980 and TCLP analysis in 1990 on the sludge deposited in the ponds. The test results indicated the sludge was not considered hazardous. On a daily basis, the sludge is dredged from the bottom of the active pond and transferred to the filter press. In addition, periodically sludge is dredged from the ponds and transferred to the area between the ponds. This allows any water runoff to return back to the ponds. When the PR/VSI was performed the sludge was removed by a soil crane, placed in gondolas, and disposed of into an on-site landfill. Currently, the dredged and dewatered sludge is transported off-site for disposal. The most recent TCLP analysis (July 2009) indicates the dewatered sludge is classified as non hazardous.

LOCATION: The Blast Furnace/Sinter Plant Waste Water Treatment Sludge Ponds are located in the north central portion of the Melt Plant area.

PERIOD OF OPERATION: The Sludge Ponds were installed in 1952 and are currently in operation. The sinter plant operated from 1972 through 2003.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Ponds manage wastewater from the blast furnace, from the former Sinter Plant scrubbers, and the water softener system. In addition, the sludge is processed through a filter press. Annual waste characterization samples are collected for off-site disposal. The most recent sampling event (July 2009) indicates that the waste is characterized as non-hazardous.

ENGINEERED CONTROLS: AK Steel has indicated that the bases of the sludge ponds were originally constructed of clay. The transfer pumps system is used to control water levels in the ponds to decrease the possibility of overflow.

DESCRIPTION OF RELEASES: There has been no documentation of any releases associated with the Sludge ponds. During the PR/VSI sludge was deposited in a drainage swale on the east side of the north pond. During the CCR site visit (May 2006), any accumulated sludge appeared to be contained between the two ponds where any residual runoff would be captured within the ponds. In Dr. Chirlin’s export report he indicated that if the ponds were unlined they may leak through the bottom releasing contaminants to the soil and groundwater.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred at the Blast Furnace/Sinter Plant Waste Water Treatment Sludge Ponds.

DATA GAPS: The potential for a release to the environment is moderate because the lagoons are unlined. A release assessment has not been completed and is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number BC-466, "Sludge Ponds-Earthwork and Concrete Details", August 20, 1952.

AK Steel Drawing Number 572831, "Sludge Ponds Piling Wall", November 25, 1970.

AK Steel Drawing Number 613017, "Pollution Control Recycle Plant", March 7, 1973.

AK Steel Drawing Number 576892, "Extension of Sludge Ponds", March 21, 1974.

AK Steel Drawing Number 613032, "Sludge Sump and Pump Base at Sludge Ponds and Pipe Support Foundations". August 17, 1974.

AK Steel Drawing Number 613028, "Sludge Pond to Contaminated Sewer Piping", August 22, 1974.

AK Steel Drawing Number 7195-M106, "Outfall Discharge Program", May 23, 1975.

AK Steel Drawing Number 565242, "Overhead 6" Sludge Pipe Support from Pump House to Sludge Pond", July 11, 1984.

AK Steel Drawing Number 703385, "Sludge Pond – Repairs-Site Plan", July 1, 1997.

AK Steel Drawing Number 703386, "Sludge Pond – Repairs-Plan & Sections", July 1, 1997.

AK Steel Drawing Number 703387, "Sludge Pond – Repairs", July 1, 1997.

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

Waste Characterization; Order Number 09G1075, Belmont Labs, July 21, 2009

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SWMU 12 – Blast Furnace/Sinter Plant Wastewater Treatment Facility

UNIT DESCRIPTION: The Blast Furnace/Sinter Plant Wastewater Treatment Facility consists of three clarifiers of which two are operational and the third functions as an emergency backup. The clarifiers receive wastewater from the Blast Furnace/Sinter Plant Waste Water Treatment Sludge Ponds (SWMU 11) and discharge the treated water into internal Outfall 613 and external Outfall 011. The water received at the wastewater treatment facility is processed to further remove suspended solids and to adjust the pH. The removed suspended solids are transferred back to the Blast Furnace/Sinter Plant Waste Water Treatment Sludge Ponds (SWMU 11). Originally the facility was designed to handle raw water treatment, but it was converted to a wastewater treatment facility in the 1970s.

MATERIALS MANAGED: Wastewater from the Blast Furnace/Sinter Plant Waste Water Treatment Sludge Ponds (SWMU 11) is pumped to this facility for further polishing treatment. After polishing the water is then discharged to internal Outfall 613 and external Outfall 011.

LOCATION: The Blast Furnace/Sinter Plant Wastewater Treatment Facility is located in the northwest portion of the Melt Area.

PERIOD OF OPERATION: The Blast Furnace/Sinter Plant Wastewater Treatment Facility began service as a wastewater treatment facility in the 1970s, and it is currently in operation.

CURRENT WASTE MANAGEMENT DESCRIPTION: Wastewater received in the clarifiers originates from the Blast Furnace gas scrubber and water softener system in the Melt Plant Area. After clarification wastewater is pumped into the storm sewer system. The suspended solids removed during remediation are returned to the Blast Furnace/Sinter Plant Wastewater Treatment Sludge Ponds (SWMU 11).

ENGINEERED CONTROLS: The clarifiers are located on top of a concrete pad, where spillage is collected and drained back into the blast furnace ponds (SWMU 11). In addition, the pH and flow rate is monitored.

DESCRIPTION OF RELEASES: No documented releases or spills have been reported from the Blast Furnace/Sinter Plant Wastewater Treatment Facility.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred at the Blast Furnace/Sinter Plant Wastewater Treatment Facility.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel Drawing Number 7195-M106, “Outfall Discharge Program”, May 23, 1975.

AK Steel Drawing Number 580790, “Reactor Tank Enclosure”, June 1976.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

Waste Characterization; Order Number 09G1075, Belmont Labs, July 21, 2009.

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SWMU 13 – BOF Wastewater Treatment Facility

UNIT DESCRIPTION: During the 1991 Preliminary Review/Visual Site Inspection (PR/VSI) visit, the Basic Oxygen Furnace (BOF) Wastewater Treatment Plant consisted of a hydroclone, three clarifiers (two large, one small), and vacuum filters. Currently the BOF Wastewater Treatment Facility consists of a hydroclone, two equally sized clarifiers, a small clarifier, vacuum filters. The clarifiers receive wastewater from the hydroclone. Solids collected from the clarifiers are transferred to three vacuum filters for dewatering. The dewatered sludge is then transferred to trucks for off-site disposal. After treatment the wastewater is discharged into Dicks Creek via external Outfall 003.

MATERIALS MANAGED: Wastewater created during BOF scrubbing activities is transferred to the BOF Wastewater Treatment Facility. This water undergoes treatment and is discharged to internal Outfall 631 and to Dick's Creek via external Outfall 003.

LOCATION: The BOF Wastewater Treatment Facility is located in the central portion of the Melt Plant Area.

PERIOD OF OPERATION: According to the PR/VSI the BOF Wastewater Treatment Plant was built in 1969, and it is currently in operation.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently wastewater from the BOF scrubbing activities is managed at the BOF Wastewater Treatment Facility. Sludge collected from the bottom of the clarifiers is dewatered through the use of a vacuum filter and transferred off-site for disposal. Clarifier fines from the cyclone are stored temporary on the ground surface. Annual waste characterization samples for the sludge and fines are collected for off-site disposal. The most recent sampling event (July 2009) indicates that the waste is non-hazardous.

ENGINEERED CONTROLS: The dewatered sludge loading is located on a curbed concrete pad under a canopy. At this time, the clarifier fines are stored on the ground.

DESCRIPTION OF RELEASES: No documented releases or spills have been documented from the BOF Wastewater Treatment Facility.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred at the BOF Wastewater Treatment Facility.

DATA GAPS: During the U.S. EPA and Ohio EPA site visit in May 2008, there was concern that the some cyclone fines were temporarily stored on the ground; however, the laboratory analytical reports indicated low metal concentrations.

INFORMATION SOURCES:

AK Steel Drawing Number 712400, "Off-Gas Flow Diagram", January 31, 2001.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

Waste Characterization; Order Number 09G1075, Belmont Labs, July 21, 2009.

ARCADIS

SWMU 14 – Coke Plant Wastewater Equalization Tank

UNIT DESCRIPTION: It consists of a one million gallon welded steel tank. During the 1991 Preliminary Review/Visual Site Inspection (PR/VSI) visit, the tank did not have a secondary containment system. A concrete slab secondary containment structure was added in the mid-1990s. The waste ammonia storage tank receives wastewater from an ammonia still sump, former benzol yard stormwater, stormwater from secondary containment and cooling water blow-down. The water is discharged to the City of Middletown Wastewater Treatment Plant. The equalization tank is normally half full, where the extra capacity can be used to regulate the amount of flow being discharged to the city sewer system.

MATERIALS MANAGED: Wastewater containing ammonia is received into the Wastewater Equalization Tank. The coke plant is subject to the iron and steel categorical pretreatment standard as described in 40 CFR Part 420.

LOCATION: The Coke Plant Wastewater Treatment Facility is located in the western portion of the Melt Plant Area.

PERIOD OF OPERATION: The Coke Plant Wastewater Equalization Tank was first used in the late 1970s, it is still in operation.

CURRENT WASTE MANAGEMENT DESCRIPTION: Wastewater containing ammonia is received into the waste ammonia storage tank.

ENGINEERED CONTROLS: The tank system includes a reinforced concrete pad, beneath the tank and flow controls are used to regulate discharge flow that is equipped with a siphon breaker. The secondary containment was installed in 1994 as part of the upgrades for revised SPCC plan.

DESCRIPTION OF RELEASES: According to the Preliminary Review/Visual Site Inspection (PR/VSI), during a compliance evaluation inspection of the coke plant the facility received notification that they did not achieve the pre-treatment standards standards for phenol and ammonia. In 1988, AK Steel inadvertently released wastewater with high ammonia and total kjeldahl nitrogen (TKN) into the City of Middletown's sewer system. This pre-treatment wastewater was released due to startup problems with the ammonia removal system that was temporarily shut down until the operational problems were rectified. AK Steel has indicated that excursions from the pretreatment permit are very infrequent. There were no releases to the environment at this SWMU.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred at the Coke Plant Wastewater Equalization Tank.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel Drawing Number 580960, "Contaminated Water Storage Tank", July 20, 1978.

AK Steel Drawing Number 580961, Water Storage Tank-Piping", July 26, 1978.

AK Steel Drawing Number 580962, "Contaminated Water System Details", September 17, 1978.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

ARCADIS

SWMU 15 – Former Coal Tar Decanter Sludge Recycling Area

UNIT DESCRIPTION: The Former Coal Tar Decanter Sludge Recycling Area is located in the southeast portion of the Melt Area. This area was a receiving and recycling station for tar decanter sludge (TDS), EPA listed waste number K087, generated from coking operation. Prior to these operations, the tar decanter sludge was sprayed directly onto the Robin Hood Coal Pile (SWMU 17). A coal conveyor transferred the recycled product into the coke ovens where it was mixed with coal. A fuel tank was also stored in this area that was used in the mixing operations. An outside contractor, AKJ Industries, operated the recycling system. The system was decommissioned in 1995. During the CCR site visit only a concrete slab remained in this area.

MATERIALS MANAGED: Tar is a byproduct from the destructive distillation of coal. The tar precipitates out of coke oven gas during the gas cooling and cleaning process. Tar and flushing liquor flow to a decanter where the liquor and tar are separated. The tar is pumped to a tar storage tank for internal use or re-sale. While in the decanter heavier tar particles and coke fines settle to the bottom and are removed, this material is referred to as tar decanter sludge (TDS), . TDS is a hazardous waste produced during coking operations. The heavy TDS is removed from the area of the coke plant into the heavy tar containers or heavy boxes at the Wilputte and Still TDS areas. The loaded containers are then transferred to the recycling area where it is placed into a tank with number 2 fuel oil, which acts to dilute the TDS. It is then applied onto the coal at the conveyers going into the coke ovens. The TDS is kept in containers or tanks prior to recycling. Both tar and coke are recovered from this recycling step.

LOCATION: The Former Coal Tar Decanter Sludge Recycling Area is located in the southeast portion of the Melt Area.

PERIOD OF OPERATION: The coal tar decanter sludge recycling operation began 1990 when the Robin Hood Coal Pile (SWMU 17) was taken out of service. AK Steel contracted AKJ Industries in 1990 to begin operation of the Coal Tar Decanter Sludge Recycling Area. This area was decommissioned in 1995.

CURRENT WASTE MANAGEMENT DESCRIPTION: There are no wastes stored currently in the Former Coal Tar Decanter Sludge Recycling Area. The only structure left in this area is a bermed concrete slab.

ENGINEERED CONTROLS: AKJ industries created a spill prevention plan associated with the Coal Tar Decanter Sludge Recycling Area. The plan outlines the transportation and unloading operations, a spill prevention plan, spill contingency and clean up procedures, and spill reporting. In addition all employees associated with this area received training appropriate for dealing with hazardous wastes, in this case TDS. In addition the area is constructed of concrete and is bermed to contain spills. During the CCR site inspection (May 2006), the concrete was holding standing water, indicating that no leaks were present.

DESCRIPTION OF RELEASES: During an inspection on September 11, 1990, the Ohio EPA noted and photographed releases from this unit through the PVC pipes which drain the containment area. During the CCR site visit (May 2006) the containment area held standing water and there were no controls to empty the containment area. The contaminated area is vacuumed now to remove standing water. During the Preliminary Review/Visual Site Inspection (PR/VSI) visit, coal tar spillage was observed inside and outside the bermed area.

PREVIOUS INVESTIGATIONS: There have been no previous investigations related to the Former Coal Tar Decanter Sludge Recycling Area.

DATA GAPS: There are documented releases and a release assessment has not been completed, this is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number 582770, "Outfall 003", August 30, 1979.

AKJ, Date unspecified, "K087 Coal Tar Decanter Sludge Operations," Internal memorandum.

Batliner, Carl, ARMCO Steel Company, L.P., Letter to Dave Foster, AKJ Industries, "New Procedures for Handling Tar Decanter Sludge." February 27, 1991.

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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SWMU 16 – Former Coal Tar Decanter Sludge Collection Bins

UNIT DESCRIPTION: The Former Coal Tar Decanter Sludge Collection Bins were located in the southern portion of the Melt Area. The collection bins or heavy boxes received Coal Tar Decanter Sludge (TDS) produced as a by-product of the coke processes and were delivered to the Former Coal Tar Decanter Sludge Recycling Center (SWMU 15). Before 1990, the bins contained TDS to the Robin Hood Coal Pile for recycling. During the CCR site visit all of the structures related to the collection bins had been removed from the area. Only the concrete slab and partially removed guide rails were located on-site.

MATERIALS MANAGED: TDS, EPA listed waste number K087, was managed in the collection bins. TDS is a hazardous waste produced during coking operations.

LOCATION: The Former Coal Tar Decanter Sludge Collection Bin was located in the southern portion of the Melt Area.

PERIOD OF OPERATION: The Former Coal Tar Decanter Sludge Collection Bins began operating in 1976 and ended in 1995.

CURRENT WASTE MANAGEMENT DESCRIPTION: There are no wastes currently stored in the Former Coal Tar Decanter Sludge Collection Bin area.

ENGINEERED CONTROLS: AKJ industries created a spill prevention plan associated with the Coal Tar Decanter Sludge Processes. The plan outlines the transportation and unloading operations, a spill prevention plan, spill contingency and clean up procedures, and spill reporting. In addition all employees associated with this area received training appropriate for dealing with hazardous wastes, in this case TDS. During an Ohio EPA site visit in January 1990 the bins were stored on small concrete pads. During this site visit TDS had spilled outside of the concrete area onto the ground.

After this inspection, soil and waste were excavated and the entire area was covered with a concrete pad and a concrete berm was installed to act as a secondary containment structure control any spillage of TDS from the bins. In addition procedures were put in place to replace full bins with empty ones to eliminate the possibility of overflow.

DESCRIPTION OF RELEASES: There are no documented releases or spills from the collection bins were observed.

PREVIOUS INVESTIGATIONS: On January 9, 1990, Ohio EPA collected samples of TDS waste which had been deposited on the ground in the vicinity of the drop box and collection bin areas (the concrete observed during the PR/VSI was less than one year old). Analysis of this sample revealed the presence of organic compounds that are found in K087 waste. Concentrations ranged from 1.3 to 100 ppm. In November 1992 a sample of the TDS was collected by the Ohio EPA from the concrete pad underlying the bins, analysis of this sample indicated that the concentration of benzene was 17 parts per million.

DATA GAPS: There is potential for release of TDS into the environment and a release assessment has not been completed and is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number 620286, “Coke Plant-General Arrangement-West Half”, August 28, 1974.

AK Steel Drawing Number 620830, “Flushing Liquor Pump Area for Still Batteries-TDS Containment Area, Contaminated Soil Removal Plan”, June 1, 1990.

AK Steel Drawing Number 620831, “Flushing Liquor Pump Area for Still Batteries-TDS Containment Area, Embedded Conduit and Underground Pipping”, June 1, 1990.

AK Steel Drawing Number 620832, “Flushing Liquor Pump Area for Still Batteries-TDS Containment Area, Plan and Arrangement”, May 3, 1990.

AK Steel Drawing Number 620833, “Flushing Liquor Pump Area for Still Batteries-TDS Containment Area, Sections”, June 7, 1990.

AK Steel Drawing Number 620834, “Flushing Liquor Pump Area for Still Batteries-TDS Containment Area, Sections”, June 11, 1990.

AKJ, Date unspecified, “K087 Coal Tar Decanter Sludge Operations,” Internal memorandum.

Batliner, Carl, ARMCO Steel Company, L.P., Letter to Dave Foster, AKJ Industries, “New Procedures for Handling Tar Decanter Sludge.” February 27, 1991.

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 17 –North Section of Former Northern Tar Lagoon (Near the Robin Hood Coal Pile)

UNIT DESCRIPTION: Prior to the Robin Hood Coal storage area, the foot print of the tar lagoons were present beneath much of the eastern end of the coal pile. The operations of the tar lagoons were observed in the aerial photographs between March 1956 and June 1966.

MATERIALS MANAGED: Based on laboratory analytical results from over-excavation activities of the former tar lagoons in 1990, the materials managed in the former tar lagoons were very similar to tar decanter sludge.

LOCATION: The former Tar Lagoon and Robin Hood Coal Pile operations are located in the southeastern portion of the Melt Plant Area.

PERIOD OF OPERATION: The tar lagoons operation is first observed in the 1956 aerial photograph. According to the Closure Certification Report by Cox-Colvin & Associates Inc. tar ponds were present beneath much of the eastern end of the former Robin Hood Coal Pile in the early 1960's. While TDS was not expected to have been placed in these ponds, the tar disposed of would have contained similar constituents as those found in TDS. Prior to being used as a coal storage area in the early 1970s, much of the tar was removed and the remaining residual tar was spread throughout the eastern end of the Robin Hood Coal Pile. In 1990, the residual tar beneath the eastern end of the coal pile was excavated and transported for off-site disposal, except northern section of one of the former tar ponds, due to access availability (the plant road is currently present). After conversion to a coal pile storage area, the Robin Hood Coal Pile would have received "High Vol" coal. During an Ohio EPA inspection in 1989, AK Steel was cited for operating an unauthorized hazardous waste storage pile. In response to the violation, AK Steel ceased recycling TDS by adding it to the coal pile in March 1990. Beginning in 1993 and continuing until 2000, petroleum coke, known as "Petcoke", was temporarily stored in the western end and mixed with High Vol coal at the eastern end of the former Robin Hood Cal Pile.

In 2000 the Robin Hood Coal Pile underwent closure under Ohio EPA RCRA Closure Program. On June 13, 2000 the Ohio EPA approved the closure.

CURRENT WASTE MANAGEMENT DESCRIPTION: The area of the former tar lagoons and Robin Hood Coal Pile does not currently store any wastes. During the CCR visit in May 2006 a small volume of coal was being stored in the area of the former Robin Hood Coal Pile.

ENGINEERED CONTROLS: There were no engineering controls in place during the operation of the former tar lagoons and Robin Hood Coal Pile.

DESCRIPTION OF RELEASES: There are no documented releases from the tar lagoons.

PREVIOUS INVESTIGATIONS: During closure an extensive investigation was performed on the former Robin Hood Coal Pile. The conclusion of the investigation was that, with the exception of one location, K087 had not been released to underlying soil and there were no impacts to groundwater related to K087 in this area. Closure performance standards at the possible release location were achieved through the removal of soil containing benzene and toluene above statistically-derived background limits.

DATA GAPS: The release potential into the environment has not been assessed in the northern portion of the former tar lagoon and is considered a data gap.

INFORMATION SOURCES:

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Cox-Colvin and Associates, Closure Certification Report, AK Steel Corporation, Middletown, Ohio. May 2000.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

Ohio EPA, Letter to Carl Batliner: Completion of Closure, AK Steel Corporation. June 2000.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 18 – Former Open Hearth WWTP

UNIT DESCRIPTION: The former Open Hearth wastewater treatment plant (WWTP) accepted wastewater from the Open Hearth Furnace and the Basic Oxygen Furnace (BOF). According to the PR/VSI the WWTP's principal components were clarifiers and vacuum filters. During the PR/VSI the WWTP was not in operation, but the structural components were still in place. The WWTP was demolished in 1993. During the CCR visit only an outline of the WWTP structures were in place. Plant drawings indicate that there were two clarifiers to the northwest of building number 5491.

MATERIALS MANAGED: During the PR/VSI it was noted that the wastewater received at this WWTP was from the gas cleaning systems (scrubbers associated with the Open Hearth furnaces). Sludge was a byproduct of the treatment system. Plant Drawings indicate BOF wastewater was treated at this location. The wastewater would have contained zinc, iron, fluoride, and suspended solids. After treatment the water would have been discharged via internal Outfall number 631 to external Outfall number 003 into Dicks Creek.

LOCATION: The Former Open Hearth WWTP was located just north of building number 5491 in the north Melt Area. Currently Building 5491 (Door 342A) is used as a storage facility for various equipment. At one point the building apparently functioned as part of a wastewater treatment facility as indicated by the door outside the building reading "No. 2 O.H. Water Treatment Plant." This building contained the vacuum filters for dewatering sludge and the recycle pumps that recycled greater than 95% of the treated wastewaters. These wastewaters were returned to the scrubbers for re-use.

PERIOD OF OPERATION: Building Number 5491 states that the building was "made hot" in July 10, 1970. Demolition of the Former Open Hearth WWTP occurred in 1993.

CURRENT WASTE MANAGEMENT DESCRIPTION: No current materials are stored at the facility. Part of the WWTP facility is now used as a warehouse for miscellaneous equipment.

ENGINEERED CONTROLS: The components (i.e., clarifiers) of the WWTP set upon a concrete pad.

DESCRIPTION OF RELEASES: There has been no documentation of any releases associated with the Former Open Hearth WWTP. During the PR/VSI no evidence of past releases was present as the remaining tanks, clarifiers, and other unit operations did not appear to be damaged or stained.

PREVIOUS INVESTIGATIONS: There have been no previous investigations into the Former Open Hearth WWTP.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel Drawing Number 582770, "Outfall 003 Possible", August 30, 1979.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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SWMU 19 – Former Used-Oil Storage Area

UNIT DESCRIPTION: The Former Used-Oil Storage Area was located adjacent to the Former Open Hearth Wastewater Treatment Plan (SWMU 18). According to the PR/VSI the Former Used-Oil Storage Area was constructed of concrete with no secondary containment. The PR/VSI also stated that used oil from various plant processes was transported to the Used-Oil Storage Area where it was mixed with fuel oil and stored in 55-gallon drums until reused in the plant. During the CCR site visit the Former Used-Oil Storage Area was not discernable from the surroundings. AK Steel has indicated that this unit was inaccurately described during the PR/VSI as an oil storage area because the area was not routinely used for that purpose. The Former Used-Oil Storage Area was possibly in an area designated for the mason's cleaning of refractory equipment.

MATERIALS MANAGED: According to the PR/VSI AK Steel blended fuel oil with the used oil in drums that were stored at this location. However, this assertion was not be corroborated by AK Steel representatives.

LOCATION: The Former Used-Oil Storage Area is located in the northern Melt Area adjacent to the Former Open Hearth Wastewater Treatment Plant (SWMU 18).

PERIOD OF OPERATION: An AK Steel representative indicated that this area was inaccurately described and the area was not routinely used to store used oil.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently there are no wastes stored in the vicinity of the Former Used-Oil Storage Area.

ENGINEERED CONTROLS: The Former Used-Oil Storage Area could not be located during the CCR site visit and, therefore, it could not be determined if any engineering controls were in place. The PR/VSI stated that the drums were stored on a concrete floor, but that the floor lacked secondary containment.

DESCRIPTION OF RELEASES: There have been no documented releases related to the Former Used-Oil Storage Area. During the PR/VSI two drums of poor condition and staining around the drums was observed. An AK Steel representative indicated that the two drums observed were being temporarily stored and that the area was not routinely used for used oil storage.

PREVIOUS INVESTIGATIONS: There have been no previous investigations into the Former Used-Oil Storage Area.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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SWMU 20 – Former Benzol Tank Farm Area (Including Tar Tank Sludge Storage Area)

UNIT DESCRIPTION: The Former Benzol Tank Farm Area was part of a byproduct recovery facility associated with the Coke Plant. In addition to a tank farm the facility contained various distillation columns, heat exchangers, and piping. The facility was used to recover benzene and various products created as a byproduct from coking-operation. The tank farm consisted of a series of above-ground storage tanks containing recovered fuels. The byproducts were sold to various off-site facilities. In the 1980s four tanks were removed and their secondary containment structures were converted to manage tar bottoms generated by the coke plants. The tar bottoms were removed from the Tar Tanks (AOC 2) and placed in this facility until it was recycled on-site. During the CCR site visit (May 2006), all structures related to the Former Benzol Tank Farm Area had been removed. According to an internal AK Steel memorandum the Benzol Tank Farm Area was decommissioned in the mid-1990s. After decommissioning and prior to demolition the concrete secondary containment structures associated with the above ground tanks were cleaned using sandblasting equipment. Upon demolition the concrete secondary containment structures were buried in this area. All of the associated tanks were cleaned upon decommissioning and sold off-site as scrap metal.

MATERIALS MANAGED: The Former Benzol Tank Farm Area managed recovered benzene and various byproducts created as a byproduct from coking-operations. The main chemicals controlled in this area were light distillates benzene and toluene. These light residuals were transferred to the Former Rail Car Transfer Area (AOC 4) where they were shipped off-site by train and trucks for sale. Heavy residues such as tar were managed in the Tar Tanks (AOC 2).

LOCATION: The Former Benzol Tank Farm Area is located in the southern portion of the Melt Area.

PERIOD OF OPERATION: The Former Benzol Tank Farm Area was first used in the 1950s. The system was shut down in 1984 due to a decreased need for these products. After the shut down a portion of this area was converted to handle tar bottoms generated from the Tar Tanks (AOC 2). The tank farm associated with the Benzol Facility was still present during the Preliminary Review/Visual Site Inspection (PR/VSI) visit in 1991, but most of the tanks were not in use. Coal tar was being stored in the Tar Tanks (AOC 2) near the tank farm during the PR/VSI visit. According to an internal AK Steel memorandum the Benzol Tank Farm Area was decommissioned and demolished in the mid-1990s. Upon demolition the concrete secondary containment structures were buried in this area.

CURRENT WASTE MANAGEMENT DESCRIPTION: All related structures had been removed prior to the CCR site visit. There are no wastes currently managed in this area.

ENGINEERED CONTROLS: A 3-foot high concrete impoundment surrounded each tank in the tank farm according to the PR/VSI. AK Steel Drawings indicate structures were in place around each tank. In the 1980s a portion of this area was converted to handle tar bottoms generated from the Tar Tanks (AOC 2). A sub-grade, impermeably, concrete bermed surface was built in this converted area.

DESCRIPTION OF RELEASES: There have been no documented releases related to the Former Benzol Tank Farm Area. During the PR/VSI visit there was a residue of red- and green-colored solutions in the secondary containment impoundments of some of the tanks, possibly indicating releases from the above-ground storage tanks that were being managed by the secondary containment.

PREVIOUS INVESTIGATIONS: There have not been any previous investigations into the Former Benzol Tank Farm Area.

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DATA GAPS: The release potential into the environment has not been assessed and the management of coke by-products in this area is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number BE-1273, "Arrangement of By Product and Benzol Plants – East Half", July 25, 1951.

AK Steel Drawing Number 618001, "Coke Plant Area, Plot Plan", November 5, 1975.

AK Steel "Banked Air Emissions – AK – Middletown Works," Internal Memorandum.

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SWMU 21 – Former Used Oil Accumulation Area (by Sinter Plant)

UNIT DESCRIPTION: The Former Used Oil Accumulation Area is located at the former Sinter Plant. This area was used as a staging area for drums containing used oil. These drums were staged on a concrete pad prior to recycling. During the CCR site visit (May 2006) the exact area referred to in the Preliminary Review/Visual Site Inspection (PR/VSI) visit (1991) was not able to be located, but in the vicinity the area is currently being used to store iron pellets.

MATERIALS MANAGED: Used oil was managed in 55-gallon steel drums at the Former Used Oil Accumulation Area until it was re-used at the former Sinter Plant.

LOCATION: The Used Oil Accumulation Area is located in the central portion of the Melt Area, where the former Sinter Plant was located.

PERIOD OF OPERATION: It is unclear when AK Steel began accumulating 55-gallon drums of used oil in this area. This practice was discontinued in 2003. The Sinter Plant was in operation from 1974 until 2003.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Former Used Oil Accumulation Area is no longer in use.

ENGINEERED CONTROLS: The area consisted of a concrete pad.

DESCRIPTION OF RELEASES: There is no documentation of any releases related to the Former Used Oil Accumulation Area. During the 1991 PR/VSI visit, oil-stained soil was observed near the drums. However, during the CCR site visit in May 2006, the sinter plant and surrounding structures have been demolished. The location of the former drums was not located.

PREVIOUS INVESTIGATIONS: No previous investigations have been done on the Former Used Oil Accumulation Area.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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SWMU 44 – Coke Oven Gas Pipeline and Release Area

UNIT DESCRIPTION: In January 1996, carbon monoxide was detected in two homes located on Ottawa Street, adjacent to the western boundary of the facility. It was determined that a release of coke oven gas had occurred from a leak from the distribution pipeline (SWMU 44). AK Steel isolated and removed the section of the pipeline and was temporary abandoned until the line was removed from service in 2000.

Subsequently site investigation activities were implemented to assess the soil and groundwater conditions from the release area. The wells were installed in two saturated zones, one representing the shallow groundwater zone or the upper aquifer (total depth at approximately 15 feet bls) and the other representing the intermediate aquifer unit of the site (total depth at approximately 45 feet bls).
The coke oven gas pipeline release and the area of the former coke oven gas pipeline were determined to be the likely sources for the levels of benzene found in the groundwater. The occurrence and relative distribution of benzene, toluene, ethylbenzene and xylene (BTEX) compounds identified in the groundwater are consistent with their presence in coke oven gas within the pipeline. The results of this investigation indicated that benzene concentrations were present in the shallow groundwater zone both on-site and off-site properties to the west of AK Steel's property line.

On April 1996 through March 1998, corrective actions were implemented by installing a soil vapor extraction (SVE) system to remediate the shallow impacted soils. The system operated for approximately two years and appeared to remediate the impacted shallow soils, based on field and laboratory data.

To address the impacted groundwater in the shallow groundwater zone, a pump and treat system was installed in 1998. However, the operation of the groundwater treatment remedial system was limited due to severe drought conditions or limited recharging in the upper aquifer. Additionally, AK Steel purchased ten residential parcels to the west of the property line, and demolished the structures and converted the properties into a green belt area between 1997 and 1999. Furthermore, AK Steel removed, cleaned, and properly disposed approximately 28,450 linear feet of piping and drip legs conveyed from the Hamilton Works (Hamilton, Ohio) to the Middletown Works between 1999 and 2000.

In April 2000, August 2000, and May 2005, remediation of the shallow aquifer was implemented to address any remaining residual benzene concentrations in groundwater by injecting BIOX™ (an aerobic oxidizer) into existing monitoring wells and soil borings. Subsequent groundwater sampling events were completed and benzene concentrations were below laboratory detection levels during the last sampling event (August 2007).

MATERIALS MANAGED: During the process of transforming coal into coke, coal is heated within relatively airtight chambers (coke ovens) in order to drive off moisture and more volatile organic constituents. Coke oven gas is the resulting vapor and it is collected, processed, scrubbed, and then distributed to other parts of the facility for use as a fuel. Coke Oven Gas is comprised predominantly of methane (40-50 percent), nitrogen (10-25 percent), carbon monoxide (10-20 percent), hydrogen (10-15 percent), carbon dioxide (2-10 percent), ethane (<9 percent), ethylene (<7 percent), benzene (<5 percent), toluene (<2 percent), hydrogen sulfide (0.1 to 2 percent), and naphthalene (<1.5 percent), based on weight.

LOCATION: The Coke Oven Gas Pipeline Release is located in the southwestern portion of the Melt Area near the plant boundary between the Coke Plant and the Blast Furnace areas.

PERIOD OF OPERATION: The Coke Ovens began to be first used in the early 1950s and it is anticipated that the process of collecting coke oven gas would have started shortly thereafter. The COG pipeline was shut down in this area in 1996 and the whole COG line was eventually decommissioned between 1999 and 2000.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Coke Oven Gas Pipeline and Release Area does not specifically manage wastes in this area. This area is designated because of a historic release that has been remediated using various technologies beginning in 1996. The COG pipeline no longer runs through this area.

ENGINEERED CONTROLS: Engineering Controls are not applicable to the Coke Oven Gas Pipeline and Release Area.

DESCRIPTION OF RELEASES: The release which occurred on January 24, 1996 is the only release associated with this area.

PREVIOUS INVESTIGATIONS: Since the historic release AK Steel has initiated several investigations and remedial activities. The results of these investigations indicate that BTEX compounds (primarily benzene) had impacted shallow groundwater beneath the vicinity of the former Coke Oven Gas Pipeline and adjacent properties. The groundwater plume correlates strongly with the former Coke Oven Gas Pipeline route. Annual reports are submitted to the Ohio EPA updating the progress of the remedial activities. The most recent (August 2007) laboratory analytical results in groundwater indicated that benzene concentrations were below laboratory detection levels from the monitoring well network

DATA GAPS: Based upon the current conditions of the site, there appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel Drawing Number 628008, “Natural and Coke Distribution Systems, Routing of Natural and Coke Oven Gas Lines, “Coke Oven Gas Piping, Key Plan”, July 11, 1966.

AK Steel Drawing Number 628012, “Hot Metal Area, Coke Oven Gas Piping”, February 15, 1977.

AK Steel Drawing Number 628013, South Plant Area, Coke Oven Gas Piping”, February 17, 1977.

AK Steel Drawing Number 628010, “North Plant Area, Coke Oven Gas Piping”, March 3, 1977.

AK Steel Drawing Number 628011, “ARMCO Plant #2 and Coil Paint, Coke Oven Gas Piping”, Mach 17, 1977.

AK Steel Drawing Number 588779, “Coke Oven Gas Piping, Key Plan”, January 21, 1987.

AK Steel Drawing Number 635204, “COG Piping, Drip Pot Typ ARRGT”, October 16, 1995.

AK Steel Drawing Number 635205, “COG Piping, Drip Pot Details”, October 16, 1995.

AK Steel Drawing Number 635206, “COG Piping, Drip Pot Details”, October 16, 1995.

AK Steel Drawing Number 635207, “COG Piping, Layout”, October 18, 1995.

ARCADIS. Annual Groundwater Monitoring of Coke Oven Gas Pipeline Release, AK Steel Corporation, Middletown Works, Middletown, Ohio. January 14, 2008,

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental

Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Dames and Moore Group, Report Shallow Groundwater Investigation, Former Coke Oven Gas Pipeline Area, AK Steel Plant, Middletown, Ohio. July 1996.

Dames and Moore Group, Status Report, Pilot Groundwater Pumping and Treatment System, AK Steel Middletown Works. August 1999.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

Ohio EPA, AK Steel Middletown Works – Coke Oven Gas Plant Release. November 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SHAW Environmental, Inc., Status Report for AK Steel Corporation, COG Pipeline Leak Remediation Project, Monitoring of the Uppermost Saturated Zone/Pilot Application of Chemical Oxidation Reagent, AK Steel Middletown Works, Middletown, Ohio. December 30, 2005.

ARCADIS. 2008. Annual Groundwater Monitoring of Coke Oven Gas Pipeline Release, AK Steel Corporation, Middletown Works, Middletown, Ohio. January 14, 2008.

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AOC 1 – Coke Quenching Water Collection Plant

UNIT DESCRIPTION: The Coke Quenching Water Collection Plant is a basin which collects water used to cool hot coke removed from the coking ovens of the Wilputte operations. Coke solids settled out of the water and accumulate in the rectangular shaped concrete basin. The water collected is recycled back to the adjacent quenching tower. The coke solids are dredged weekly and staged temporarily on the ground, before being transported to be sold as a byproduct (coke breeze). Based on the plant drawings, the collection pit is approximately 100 feet long, 17 feet wide and 18 feet deep.

MATERIALS MANAGED: Water used to cool hot coke removed from the coking ovens is managed in the basin until it is recycled back to the adjacent quenching tower. The materials managed include coke (carbon) and water. No hazardous constituents have been identified.

LOCATION: The Coke Quenching Water Collection Plant is located in the extreme western portion of the Melt Area.

PERIOD OF OPERATION: The Coke Quenching Water Collection basin began operation in 1952 and is currently in operation.

CURRENT WASTE MANAGEMENT DESCRIPTION: Water used to cool hot coke removed from the coking ovens is managed in the basin until it is recycled back to the adjacent quenching tower.

ENGINEERED CONTROLS: The Collection basin is constructed of concrete and is operated on level control. There is no secondary containment structure surrounding the collection basin.

DESCRIPTION OF RELEASES: No documented releases associated with the Coke Quenching Water Collection Plant have occurred.

PREVIOUS INVESTIGATIONS: There have been no previous investigations into the Coke Quenching Collection Plant.

DATA GAPS: The release potential into the environment, due to the unknown integrity of the concrete basin is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing number 29353, “Cable Duct System General Layout”, August 30, 1951.

AK Steel Drawing number 28590, “Quenching Station Settling Basin Sheet #1”, March 26, 1959.

AK Steel Drawing number 28591, “Quenching Station Settling Basin Sheet #2”, March 26, 1959.

AK Steel Drawing number 28592, “Quenching Station Settling Basin Sheet #3”, March 26, 1959.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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AOC 2 – Tar Tanks

UNIT DESCRIPTION: The former Tar Tanks consisted of two steel above-ground tanks located near the coke plant. The tanks were installed in the early 1950s and consisted of a riveted 635,000-gallon capacity tank (west tank) and a larger welded 700,000-gallon capacity tank (east tank). In 1993 the Tar Tanks were retro-fitted with mixers to keep heavy particles suspended and decrease the accumulation of sludges at the base of the tanks. The western and eastern tar tanks were decommissioned in 1994 and 2008, respectively.

MATERIALS MANAGED: The Tar Tanks facility stores coal tar pumped over from the coke oven gas treatment operation. Tar bottoms, an EPA listed hazardous waste since 1992 (K142), is managed as a waste related to the cleanout of the Tar Tanks. Tar bottoms have not been removed from the eastern tank since the mixers were installed in 1993.

LOCATION: The Tar Tanks are located in the southeastern portion of the Melt Area, just north of Oxford State Road.

PERIOD OF OPERATION: The Tar Tanks were first used in the 1950s. The western tank was decommissioned and demolished in 1994, and the eastern tank was decommission (taken out of service in 2008.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently, the tar is stored in a 394,000 gallon aboveground storage tank with secondary containment that was placed into service in April 2008.

ENGINEERED CONTROLS: Until 1993 the Tar Tanks were located on a slag and sand bed surrounded by an earthen berm. The earthen berm was constructed in the 1960s. After the classification of coal tar bottoms by the EPA in July 1992 it was necessary for AK Steel to build a secondary containment system with a capacity of 110% of the largest tank and not subject to frost heave. In 1993 each tank was modified with a new false bottom welded circumferentially to the side walls above an eight inch layer of sand. Leak detection valves were installed in the annulus to detect future tank floor leakage. Outside the eastern tank a 30-foot high steel ring wall was installed with a steel bottom welded to the base of each tank to provide additional secondary containment. In addition a new concrete area common to both tanks was installed to prevent ground contact of materials during future tank cleanouts. The concrete area remained when the western tar tank was decommissioned and demolished in 1994. The concrete area has a sloped area to allow access to trucks for loading and unloading purposes when tank cleanouts are necessary. Three new mixers were also installed in 1993 to increase agitation and reduce the tar bottom and sludge buildup. Currently, the western tar tank have been demolished and replaced with a new tar tank (located east of the original location). The eastern tar tank was taken out of service.

DESCRIPTION OF RELEASES: Prior to the installation of the secondary containment measures wastes related to the cleanout of the Tar Tanks were placed directly on the ground adjacent to the tanks. As noted in the 1992 Preliminary Review/Visual Site Inspection (PR/VSI) report, the tanks appear to have been patched in certain areas, possibly as the result of leaks. During an Ohio EPA site visit in 1990, 13,000 gallons of cleanout waste was observed on the ground within the earthen bermed area. A total of three documented tar spills at the tanks or tar loading station occurred in 1992 (500 gallons) and 1994 (30 and 100 gallons).

PREVIOUS INVESTIGATIONS: Monitoring wells GM-4S and GM-4D are located downgradient from the Tar Tanks at the Benzene Release Area Possibly Related to AOC 2 (AOC 8), Tar Tanks. An extensive investigation occurred in 1991 and 1992 in this area.

DATA GAPS: The release potential into the environment has not been assessed, due to the management of coke byproducts in the former tar tanks is considered a data gap.

INFORMATION SOURCES:

AK Steel “Banked Air Emissions – AK – Middletown Works,” Internal Memorandum.

AK Steel Drawing Number 592755, “Tar Tank Containment”, May 28, 1992.

AK Steel Drawing Number 592760, “Tar Tank Containment Basin”, January 27, 1992.

AK Steel Drawing Number 621576, “55’-0 Diagram Fabrication Tank Repairs”, August 5, 1992.

AK Steel Drawing Number 721471, “Tar Storage Tank, Containment Foundation Plan”, October 4, 2006.

AK Steel Drawing Number 721488, “New Tar Storage”, March 26, 2007.

ARMCO Steel Company, L.P. Coal Plant Tar Tank Containment, RES-8457, Executive Summary. 1992.

Geraghty and Miller, Inc., Investigation of On-Site Extent of Benzene in the Upper Aquifer in the Vicinity of GM-4S at ARMCO Steel Co., L.P. Middletown, Ohio. March 27, 1992.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

AOC 4 – Former Rail Car Transfer Area

UNIT DESCRIPTION: The Former Rail Car Transfer Area is located in the former Benzol processing plant. By-products were dispensed to railcars by the plant in this area. During production a drip pad was used to contain spills. The rail car loading area consisted of three bays with piping and piping was continued to a truck bay. During the CCR site visit in May 2006, the Rail Car Transfer Area was undistinguishable other than for a few abandoned rail spurs. Grass covered the area and standing water was present due to the fact that the area is a relative topographic low.

MATERIALS MANAGED: By-products were managed in this area during the operation of the former benzol processing plant. According to plant drawings each bay managed different by-products. The westernmost bay managed “Pure Benzol” and “Pure Toluol”, the center bay managed “Pure Still Residue”, “Motor Benzol”, “Crude Residue”, and “Pure Benzol”, and the easternmost bay managed “Solvent Naptha”, “Xylol”, and “Pure Benzol”. The truck bay managed “Pure Benzol” and “Pure Toluol”.

LOCATION: The Former Rail Car Transfer Area is located near the southern boundary of the Melt Area near Oxford State Road.

PERIOD OF OPERATION: The Former Rail Car Transfer Area was first used in the 1950s. The operations discontinued in the 1980s and decommissioned in the mid-1990s. The decommissioning included the removal of the Benzol pump house (building number 5193) and the Benzol tank car loading station.

CURRENT WASTE MANAGEMENT DESCRIPTION: No wastes are currently managed in the Former Rail Car Transfer Area. All of the related structures were removed prior to February 1992.

ENGINEERED CONTROLS: According to the 1992 Preliminary Review/Visual Site Inspection (PR/VSI) report, a drip pad was used to contain spills.

DESCRIPTION OF RELEASES: No documented releases are associated with Former Rail Car Transfer Area.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred related to the Former Rail Car Transfer Area.

DATA GAPS: The release potential into the environment has not been assessed, due to the former management of coke by-products is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number BE-1273, “Arrangement of By-product and Benzol Plants – East Half”, July 25, 1951.

AK Steel Drawing Number 29951, “Piping at Tank Car and Truck Loading Stations Benzol Plant”, November 22, 1952.

AK Steel Drawing Number 620287, “By-Products Plant, General ARRGT. East Half”, August 28, 1974.

AK Steel Drawing Number 618001, “Coke Plant Area, Plot Plan”, November 5, 1975.

AK Steel Corporation, “Demolition and property retirement at the Middletown Coke Plant,” Internal AK Steel Memorandum. February 18, 1992.

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

AOC 5 – PCB Transformer Storage Building (Next to Open Hearth Wastewater Treatment Plant)

UNIT DESCRIPTION: The PCB Transformer Storage Building is a corrugated metal building with a concrete slab base which currently houses mineral oil transformers. The building is labeled "Substation No. 605 E." The 1992 PR/VSI documented that the storage unit was used to store PCB containing and contaminated equipment. The entrances were locked during the PR/VSI and the building was not inventoried. From 1998 through 2000, AK Steel removed all PCB transformers from the plant.

MATERIALS MANAGED: According to AK Steel, PCB containing and contaminated equipment was stored in the PCB Transformer Storage Building. Currently, the building stores non-PCB containing transformers and associated equipment.

LOCATION: The PCB Transformer Storage Building is located just west of the former Open Hearth Wastewater Treatment Plant in the northeastern portion of the Melt Area. It is labeled as door number 341 A according to a plant site map.

PERIOD OF OPERATION: At the time of the CCR site visit, the PCB Transformer Storage Building contained mineral oil transformers. A sign on the entrance to the facility indicated "This Facility made Hot April 10, 1970." It is unclear when AK Steel began using this building to house PCB containing and contaminated equipment. From 1998 through 2000, AK Steel removed all PCB electrical equipment from the plant.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently the PCB Transformer Storage Building stores non-PCB transformers and associated equipment.

ENGINEERED CONTROLS: The Building is locked and secured. In addition, the building has a concrete slab floor.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the PCB Transformer Storage Building.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred at the PCB Transformer Storage Building.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel, Middletown Works, Engineering Report RES No. 1666MW. July 24, 1997.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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AOC 6 – Stormwater Sump and Release Areas

UNIT DESCRIPTION: The Flushing Liquor Sump was misidentified in the 1992 Preliminary Review/Visual Site Inspection (PR/VSI) report. The below-grade concrete pit collects stormwater from the surrounding curbed area including stormwater runoff from the Former Coal Tar Decanter Sludge Collection Bins (SWMU 16) and solids and condensation from coke oven gas line.

MATERIALS MANAGED: The sump collects stormwater and coke oven gas line condensate for subsequent treatment.

LOCATION: The collection Sump is located in the central portion of the Melt Area near the Coal Tar Decanter Sludge Collection Bins (SWMU 16).

PERIOD OF OPERATION: The collection Sump was built in the late 1980s and remains in operation.

CURRENT WASTE MANAGEMENT DESCRIPTION: The concrete pit collects potentially impacted runoff from the former Coal Tar Decanter Sludge Collection Bins for subsequent treatment.

ENGINEERED CONTROLS: The collection Sump is constructed of reinforced concrete.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Flushing Liquor Sump unit; however, there were three releases of flushing liquor from upstream operations, where large quantities of flushing liquor were recovered in the sump. The incidental release of 25,000, 50,000, and 50,000 gallons of flushing liquor occurred in May 1991, July 1991, and June 1992, respectively.

During the PR/VSI visit in 1991, green-colored liquid was observed next to the sump. AK Steel attributed this to algal blooms and, therefore, it was assumed that this liquid was ammonia-containing, which may indicate local releases of nitrogen-rich fluids such as flushing liquor.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred at the Flushing Liquor Sump.

DATA GAPS: The release potential into the environment has not been assessed, due to the management of coke by-products is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number 618001, “Coke Plant Area, Plot Plan”, November 5, 1975.

AK Steel Drawing Number 718874, “Outfall 003”, August 30, 1979.

AK Steel Drawing Number 718873, “Outfall 002”, February 15, 1980.

AK Steel Drawing Number 582773, “Middletown Coke Plant, Underground Piping Sanitary”, June 28, 1980.

AK Steel Drawing Number 620448, “Still Decanter Area Sump”, June 20, 1986.

AK Steel Drawing Number 620449, “Still Decanter Area Sump”, June 20, 1986.

AK Steel Drawing Number 620832, “Flushing Liquor Pump Area for Still Batteries, TDS Containment Area, Plan and Arrangement”, May 31, 1990.

AK Steel Drawing Number 620830, “Flushing Liquor Pump Area for Still Batteries, TDS Containment Area, Contaminated Soil Removal Plan”, June 1, 1990.

AK Steel Drawing Number 620831, “Flushing Liquor Pump Area for Still Batteries, TDS Containment Area, Embedded Conduit & Underground Piping”, June 1, 1990.

AK Steel Drawing Number 620833, “Flushing Liquor Pump Area for Still Batteries, TDS Containment Area, Sections”, June 7, 1990.

AK Steel Drawing Number 620834, “Flushing Liquor Pump Area for Still Batteries, TDS Containment Area, Sections”, June 11, 1990.

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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AOC 8 – Benzene Release Area Possibly Related to AOC 2, Tar Tanks

UNIT DESCRIPTION: The Benzene Release Area Possibly Related to AOC 2, Tar Tanks is defined by monitoring well GM-4S and is located approximately 200 yards southwest of the Tar Tanks. The Benzene Release Area has been characterized by the increased concentrations of benzene in monitoring well GM-4S which was installed in October 1989. Currently the Area is a fenced-in portion of the southern Melt Plant Area.

MATERIALS MANAGED: No materials are managed at the Benzene Release Area. The Tar Tanks (AOC 2) facility stores coal tar.

LOCATION: The Benzene Release Area is located downgradient from the Tar Tanks. It is located in the extreme southwest portion of the Melt Area, just north of Oxford State Road.

PERIOD OF OPERATION: The concentrations of benzene in groundwater downgradient of the Tar Tanks were observed after the installation of GM-4S in October 1989. During the first sampling event in November 1989 the concentration of benzene was 700 ug/L. The most recent groundwater data from 2005 indicates that the concentration of benzene in GM-4S has decreased to below laboratory detection levels.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently no wastes are managed in the Benzene Release Area.

ENGINEERED CONTROLS: There are no specific engineering controls associated with the Benzene Release Area.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Benzene Release Area that could account for the presence of benzene in groundwater in this area.

PREVIOUS INVESTIGATIONS: Monitoring well GM-4S has been monitored regularly since 1989. Initially GM-4S was monitored quarterly until November 2002. GM-4S was first sampled in November 1989; the concentration of benzene during this sampling event was 700 ug/L. During subsequent quarterly sampling events concentrations were 650, 680, 510, and 500 ug/L during March 1990, June 1990, September 1990, and April 1991, respectively. Further investigation to delineate the plume around GM-4S was documented in March 1992. This phase of the investigation involved hydropunch sampling, aquifer slug testing, and the installation and sampling of monitoring wells GM-50S through GM-53S. It was determined that the eastern and western extent of the benzene plume is well defined within the AK Steel property boundaries, and the benzene plume was determined to be approximately 725 feet wide. Further delineation to the south occurred when AK Steel acquired the property south of Oxford State Road and installed monitoring wells GM-54S through GM-56S (AOC 20). The soil boring information derived from the investigations indicated that no glacial till exists above the upper aquifer in the vicinity of the Tar Tanks, but a till confining layer begins near GM-52S and extends to the south, possibly extending beneath and beyond Dicks Creek.

Continued monitoring has shown decreased benzene concentrations in all wells associated with the GM-4S benzene area. GM-4S benzene concentrations have decreased significantly and benzene has not been detected during annual groundwater sampling events since 1998. The benzene concentrations continue to decrease in groundwater samples collected from wells GM-50S, GM-52S, GM-54S, GM-55S, and GM-56S. Benzene has not been detected from any of these wells since the 2000 annual sampling event. This decrease in benzene concentrations is indicative of natural attenuation within the GM-4S area. A Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment (ERA) have been conducted for the Dicks Creek Area, including the benzene release area and concluded that there are no unacceptable risks to human health or the environment at the Dicks Creek Area. Annual groundwater analytical data is located in Appendix E.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

ARMCO Steel Company, “Coal Plant Tar Tank Containment, RES-8457, Executive Summary”. 1992.

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Geraghty and Miller, Inc., Investigation of On-site Extent of Benzene in the Upper Aquifer in the Vicinity of GM-4S at ARMCO Steel Co., L.P., Middletown, Ohio. March 27, 1992.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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AOC 20 – AK/Armco Property at Oxford State Road and Ottawa Street

UNIT DESCRIPTION: This AK/Armco Property is a rectangular parcel of land located on the south side of Oxford State Road near the Coke Plant Gate entrance. The southern extent of the property is formed by Dicks Creek. This property was purchased in the early 1990s to allow access for further delineation of the benzene plume (AOC 8) associated with the Tar Tanks (AOC 2) to the north. Currently the property is surrounded by a chain-link fence and is vacant.

MATERIALS MANAGED: This property was residential prior to the purchase by AK Steel.

LOCATION: The property is located between Oxford State Road and Dick's Creek, south of the main AK Steel property, across from the Coke Plant Gate.

PERIOD OF OPERATION: AK Steel purchased the property in the early 1990s

CURRENT WASTE MANAGEMENT DESCRIPTION: No wastes are currently managed on this property.

ENGINEERED CONTROLS: The site is surrounded by a chain-link fence which has a gate and is secured with a lock.

DESCRIPTION OF RELEASES: No documented releases are associated with the AK/Armco Property south of Oxford State Road near the Coke Plant Gate entrance.

PREVIOUS INVESTIGATIONS: Monitoring Wells GM-54S, GM-55S, and GM56S are located on the property. Concentrations of benzene have been historically detected at monitoring wells GM-54S and GM-55S. Peak Concentrations were detected in GM-54S and GM-55S during the annual site-wide monitoring in March 1995 (360 and 340 ug/L, respectively). Benzene concentrations have decreased over time and the last detectable concentrations on this property was at GM-54S (10 ug/L) during the March 1999 site-wide monitoring event, with no detectable concentration of benzene present in subsequent annual sampling events up through 2005.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

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AOC 21 – Dredge Spoil Fill Area – E/W diagonal fill area between Melt Area and South Plant (2000 feet on both sides of Jackson Lane Ditch)

UNIT DESCRIPTION: The Dredge Spoil Fill Area is located in the southeast corner of the Melt Area. Currently this area is non-distinguishable. A grass field with paved roads is within the vicinity of this area. The original plan for the area included two fill areas separated by what is now a road. Area 1 was approximately 225 feet by 725 feet. Area two was south and east of area one and extended approximately 950 feet by 325 feet. A total surface area of approximately 1,300 square feet was designated as the Dredge Spoil Fill Area. This dredge spoil fill area was to accept the soil removed during channelization activities in Dicks Creek. Dicks Creek was channelized by the U.S. Army Corps of Engineers in 1966. Dicks Creek was channelized by the U.S. Army Corps of Engineers in 1966. Aerial photographs from 1962, prior to the channelization of Dicks Creek, appear to indicate that this area was a farm field. Aerial photographs taken in 1968 after channelization appear to indicate that the area contains disturbed soil. This area of the Melt Plant was undergoing construction of the BOF Mold Yard Building during this time, therefore it is impossible to distinguish the origin of the disturbed soils.

MATERIALS MANAGED: The area was designated to receive dredge spoils associated with the channelization of Dicks Creek in 1966. A review of aerial photographs was inconclusive. During the time Dicks Creek was channelized this area of the Melt Plant was undergoing construction of the BOF Mold Yard Building, it cannot be distinguished if the disturbed soil is related to construction activities or is dredge spoils.

LOCATION: The Dredge Spoil Fill Area is located in the southeast corner of the Melt Area.

PERIOD OF OPERATION: This area possibly received dredge spoils associated with the channelization of Dicks Creek in 1966.

CURRENT WASTE MANAGEMENT DESCRIPTION: This area is currently a level grassy field. It is possible this area contains dredge spoils associated with the channelization of Dicks Creek. Dredge spoil fill may contain polychlorinated biphenyls.

ENGINEERED CONTROLS: No engineering controls are associated with the Dredge Spoil Fill Area.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Dredge Spoil Fill Area.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred at the Dredge Spoil Fill Area.

DATA GAPS: The release potential into the environment has not been assessed, due to the management of suspected PCB impacted sediments/soils from Dicks Creek channelization is considered a data gap.

INFORMATION SOURCES:

Aerial Photograph 1962, Butler County Soil and Water Conservation Service.

Aerial Photograph 1968, Butler County Soil and Water Conservation Service.

ARCADIS

Coil Plant Area

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SWMU 23 – Former Coil Paint Wastewater Treatment Lagoons

UNIT DESCRIPTION: The Former Coil Paint Wastewater Treatment Lagoons were associated with the former Coil Paint Wastewater Treatment Plant (WWTP). A total of three unlined wastewater treatment lagoons were in operation from 1971 to 1978. The lagoons were installed in a sand and gravel area west of the Coil Paint Building. Two of the lagoons were used to remove suspended solids from the Coil Paint wastewater stream. The third lagoon was used to capture wastewater overflowing from the two lagoons, where the water was allowed to percolate through a sand and gravel bed into groundwater. The two main lagoons measured approximately 150 feet long by 50 feet wide and the third lagoon, measured approximately 175 feet long by 125 feet wide.

In 1985 the Former Coil Paint WWTP was closed. Of the three lagoons, one was closed in 1983 and two were closed in 1986. It is unclear how the first lagoon underwent closure in 1983 other than it was backfilled. The lagoons closed in 1986 were closed to meet Ohio EPA requirements. This closure included the backfilling of the lagoons with dirt and slag, then it was graded to drain properly. After grading, the lagoons were capped with two feet of compacted clay and seeded with grass.

The Coil Paint Area is currently owned by Materials Science Engineering except for the area that contains the Former Coil Paint Wastewater Treatment Lagoons. The closed lagoon area is largely covered with grass and a few trees. The grass is routinely mowed and the soil cover is in good condition. The area is secured with an 8-foot tall chain link fence and locked gate.

MATERIALS MANAGED: Wastewaters were managed in the Former Coil Paint Wastewater Treatment Lagoons. More specifically, two of the lagoons were used to remove suspended solids from the wastewater. The third pond was used to capture wastewater overflowing from the two lagoons, where the water was allowed to percolate through a sand and gravel bed into groundwater. During operation, wastewater containing metals (primarily trivalent chromium) associated with the operations at the Coil Paint Plant were discharged in the lagoons.

LOCATION: The Former Coil Paint Wastewater Treatment Lagoons are located in the western portion of the Coil Paint Area, just west of the Coil Paint Building.

PERIOD OF OPERATION: The Former Coil Paint Wastewater Treatment Lagoons were in operation from 1971 to 1978. The lagoons were closed between 1983 and 1986.

CURRENT WASTE MANAGEMENT DESCRIPTION: There are currently no wastes managed in the area.

ENGINEERED CONTROLS: Upon closure, at least two of the ponds were backfilled to grade to ensure proper drainage and then capped with two feet of compacted clay and then seeded with grass.

DESCRIPTION OF RELEASES: There have been no documented releases associated with the Former Coil Paint Wastewater Treatment Lagoons.

PREVIOUS INVESTIGATIONS: There have been no previous investigations at the Former Coil Paint Wastewater Treatment Lagoons.

DATA GAPS: The release potential into the environment has not been assessed, due to the unlined lagoons is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number 557992, Untitled, May 6, 1973.

AK Steel Drawing Number 679068, “Water Pollution Abatement”, May 19, 1978.

AK Steel Drawing Number 679069, “Water Pollution Abatement”, May 19, 1978.

AK Steel, Engineering Report Number 6073, Closing Coil Paint Ponds; Res-6073 PWR/LMM Coil Paint, July 22, 1986.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Visual Site Inspection at ARMCO Steel Company, Middletown, Ohio (February 13-15), February 1991.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

South Plant Area

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SWMU 28 – South Terminal Wastewater Treatment Plant

UNIT DESCRIPTION: The South Terminal Wastewater Treatment Plant (WWTP) receives wastewater from primarily three waste streams, the cold mill operations, two pickle rinse water waste streams, and electrogalvanizing line rinse water from on-site holding tanks. In addition, spent pickle liquor (SPL) filter drainings from SPL Filtration System (SWMU 34) is pumped into the South Terminal WWTP. The wastewater flows through a series of treatment stages. The primary stages are equalization, neutralization, aeration, and clarification. After the clarification process, the water is discharged in the adjacent polishing ponds (SWMU 29). The treated water is then discharged though internal Outfall 641 and external Outfall 004 to the north branch of Dicks Creek.

MATERIALS MANAGED: The South Terminal WWTP treats pickle rinse water, SPL, oily wastewater, and electrogalvanizing line rinse water. There are various reagents/additives used during each stage, such as lime, flocculants, and coagulants.

LOCATION: The South Terminal WWTP is located in the northeast section of the plant adjacent to the acid plant operations.

PERIOD OF OPERATION: The South Terminal WWTP has been operating since 1970 and is currently active.

CURRENT WASTE MANAGEMENT DESCRIPTION: SPL is used as a wastewater treatment chemical. During the wastewater operations, sludge is generated, dewatered via vacuum filters, and then transported to an off-site disposal facility. Annual waste characterization samples are collected for off-site disposal. The most recent sampling event (July 2009) indicates that the waste is non-hazardous.

ENGINEERED CONTROLS: The treatment stages are monitored continuously by both instrumentation and visual inspections. The components of the WWTP are located on impervious surfaces.

DESCRIPTION OF RELEASES: There are no documented releases related to this operation.

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

ARMCO Steel Corporation- Drawing Number 665761 “Pollution Abatement- Pickling Waste Disposal”, August, 23, 1967.

ARMCO Steel Corporation- Drawing Number 665801 “Pollution Abatement-Pickling Waste Disposal”, January 22, 1968.

ARMCO Steel Corporation- Drawing Number 665710 “Pollution Abatement- Pickling Waste Disposal”, July, 29, 1968.

ARMCO, Inc. Drawing Number 30-0547 “Schematic of Spent Pickle Liquor Surface Facilities,” June 11, 1985

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency, December 1992.

Waste Characterization; Order Number 09G1075, Belmont Labs, July 21, 2009.

SWMU 29 – South Terminal Wastewater Treatment Polishing Ponds

UNIT DESCRIPTION: The South Terminal Wastewater Treatment Polishing Ponds (Polishing Ponds) receives the treated water from the South Terminal Wastewater Treatment Plant's clarifiers (SWMU 28). The water flows though the clay-lined ponds in a clockwise direction, where suspended solids settle to the bottom of the pond. The water discharges through internal Outfall 641 and external Outfall 004 into the north branch of Dicks Creek.

MATERIALS MANAGED: The Polishing Ponds manage treated effluent from the South Terminal Wastewater Treatment Plant (SWMU 28).

LOCATION: The Polishing Ponds are north of the South Terminal Wastewater Treatment Plant (SWMU 28) and the Spent Pickle Liquor Tank Farm (SWMU 33).

PERIOD OF OPERATION: Based upon the October 1968 aerial photograph, the Polishing Ponds existed. Therefore, it is concluded that the ponds were used since the operations of the South Terminal Wastewater Treatment Plant (SWMU 28) began in 1970. The ponds are still in use.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Polishing Ponds are pumped approximately every 10 years. The sediment/sludge material is transported to an off-site disposal facility.

ENGINEERED CONTROLS: The South Terminal Wastewater Polishing Ponds are periodically inspected.

DESCRIPTION OF RELEASES: There are no documented releases related to this operation.

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: Based upon the engineering controls, there appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel- Drawing Number 665701, "Pollution Abatement- Pickling Waste Disposal Typical Section Final Lagoon", July 10, 1967.

AK Steel- Drawing Number 665710, "Pollution Abatement- Pickling Waste Disposal", July 29, 1968.

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency, December 1992.

SWMU 30 – Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets

UNIT DESCRIPTION: The Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets (Former Emergency Pond) is also known as "Red Ball Lagoon." The Former Emergency Pond was an unlined pond that was used temporarily for staging material from the South Terminal Wastewater Treatment Plant (SWMU 28) operations. It was also used to store the material during the dredging operations of the South Terminal Wastewater Treatment Polishing Ponds (SWMU 29), prior to being disposed.

MATERIALS MANAGED: Material from the South Terminal Wastewater Treatment Plant (SWMU 28) operations and material generated during the dredging operations of the South Terminal Wastewater Treatment Polishing Ponds (SWMU 29) were periodically managed for temporary periods at the Former Emergency Pond for South Terminal Wastewater Treatment Plant Upsets.

LOCATION: The Former Emergency Pond was located between the South Terminal Wastewater Treatment Plant (SWMU 28) and the South Terminal Wastewater Treatment Polishing Ponds (SWMU 29).

PERIOD OF OPERATION: The Former Emergency Pond operated approximately between 1970 to 1997.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently, there is no waste stored in the Former Emergency Pond.

ENGINEERED CONTROLS: No engineering controls are in place in the Former Emergency Pond.

DESCRIPTION OF RELEASES: There are no documented releases related to this operation.

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: Based upon the engineering controls, there appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

ARMCO, Inc. Drawing Number 30-0547 "Schematic of Spent Pickle Liquor Surface Facilities", June 11, 1985.

Klamo, Larry L., Operations Manager, AK Steel South Terminal Wastewater Treatment Plant, May 10, 2006.

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency, December 1992.

SWMU 31 – South Terminal Used Oil Recovery Facility

UNIT DESCRIPTION: The South Terminal Used Oil Recovery Facility consists of three oil/water vertical separator tanks that recover oil derivatives from the South Terminal Wastewater Treatment Plant (SWMU 28) and other operations in the North Plant and South Plant. The oil is separated by passive processes and stored in an above ground tank, prior to its re-use as a Number 6 fuel in the Slab Reheat Furnace and Boilers. In 1994, Oil Tech took over operations and added three horizontal tanks where the oil is separated by passive processes, including additional heating and decanting before being transferred to other areas of the Plant.

MATERIALS MANAGED: Oil derivatives recovered from the South Terminal Wastewater Treatment Plant (SWMU 28) operations and oil derivatives from other operations (Hot Strip Mill, Cold Strip Mills) are separated, treated, and stored in this area until use in the plant.

LOCATION: South Terminal Used Oil Recovery Facility is located inside the building adjacent to the South Terminal Wastewater Treatment Plant (SWMU 28).

PERIOD OF OPERATION: The South Terminal Used Oil Recovery Facility has been operating since the late 1960s and is currently active.

CURRENT WASTE MANAGEMENT DESCRIPTION: Oil derivatives are recovered from South Plant operations and re-used as fuel.

ENGINEERED CONTROLS: The components of the used oil recovery facility are periodically inspected and cleaned. The recovery facility is located on an impervious surface.

DESCRIPTION OF RELEASES: There are no documented releases related to this operation. Surface stains were noted in the 1992 Preliminary Review / Visual Site Inspection (PR/VSI) report, but none were observed during the May 2006 CCR site visit.

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: The release potential into the environment has not been assessed, due to the management of used oils in the area is considered a data gap.

INFORMATION SOURCES:

ARMCO Steel Corporation- Drawing Number 679097 “Pollution Abatement-#3 Cold Mill Waste”, October 10, 1968.

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency, December 1992.

SWMU 32 – Hot Slab (or Mill) Wastewater Treatment Plant

UNIT DESCRIPTION: The Hot Slab Wastewater Treatment Plant (WWTP) (referred to as the Hot Strip Mill WWTP) is primarily used for treating wastewater generated from the Hot Strip Mill. The wastewater treatment consists of three rapid mix tanks, six clarifiers, and four vacuum filters. After treatment, the water is recycled back in the Hot Strip Mill operations and the remainder is discharged through internal Outfall 005 and external Outfall 015 to Dicks Creek.

MATERIALS MANAGED: The WWTP managed strip cooling water from the Hot Strip Mill that contains iron and oils. Polymer additives are introduced in the clarifiers to enhance settling of solids and sludge is generated.

LOCATION: The Hot Strip Mill Wastewater Treatment Plant is located east of the Hot Strip Mill Building 6009, Door 619 within the South Plant area.

PERIOD OF OPERATION: The Hot Strip Mill Wastewater Treatment Plant has been operated since 1968 and is currently active.

CURRENT WASTE MANAGEMENT DESCRIPTION: During operation and maintenance periods, sludge is generated from the vacuum filters and transported to an off-site disposal facility. The sludge is classified as non-hazardous waste based upon the most recent waste characteristic analytical report (July 2009).

ENGINEERED CONTROLS: The Hot Strip Wastewater Treatment Plant is monitored by instrumentation and visual inspections.

DESCRIPTION OF RELEASES: In July 1992, microbiocide (water treatment agent) was released into Dicks Creek from Outfall 015. A fish kill was reported and notice of violation was issued by the Ohio EPA. Base upon the outcome of the release, microbiocide is no longer used in the operations.

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: Based upon the engineering controls, there appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

ARMCO Steel Corporation- Drawing Number 629941 “Water Clarification Plant”, February 23, 1966.

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency, December 1992.

Waste Characterization; Order Number 09G1075, Belmont Labs, July 21, 2009.

ARCADIS

SWMU 33 – Spent Pickle Liquor Tank Farm

UNIT DESCRIPTION: The Spent Pickle Liquor (SPL) Tank Farm consists of three reinforced fiberglass tanks used for storage. The SPL is transported via piping from the pickler building, where it used to remove mill scale. The SPL is pumped into either one of two 75,000 gallon tanks or a 10,600 gallon tank. SPL directed to the 75,000 gallon tanks is transferred through the Spent Pickle Liquor Filtration System (SWMU 34) and then into either the Eastern or Western Pickle Liquor Injection Well (HWMU 1 or HWMU 2, respectively). SPL is used as a coagulant for the North Terminal WWTP (SWMU 1) and the South Terminal WWTP (SWMU 28). The SPL stored in the 10,600-gallon tank is transported off-site, sent to the City of Hamilton wastewater treatment plant, and other off-site recyclers/reusers.

MATERIALS MANAGED: SPL is categorized as EPA hazardous waste number K062. K062 is SPL generated by steel finishing operations of facilities within the iron and steel industry. SPL is an acidic solution comprised of hydrogen chloride and ferrous chloride.

LOCATION: The SPL Tank Farm is located adjacent to the South Terminal Wastewater Treatment Plant (SWMU 28).

PERIOD OF OPERATION: The SPL Tank Farm has been in operation since approximately 1968 and is currently active.

CURRENT WASTE MANAGEMENT DESCRIPTION: SPL is transported from the picklers and stored in the SPL Tank Farm. Since the SPL is continuously being managed by deep injection into the Eastern or Western Pickle Liquor Injection Well (HWMU 1 or HWMU 2), the SPL is stored in the tanks less than 90 days. Two SPL tanks were replaced in 2004 and the ship tank was replaced in 2009.

ENGINEERED CONTROLS: The SPL Tank Farm has secondary containment constructed of reinforced concrete for a total capacity of 85,000 gallons. In addition, a sump collects liquids in the secondary containment and transfers this material for treatment at the South Terminal Wastewater Treatment Plant (SWMU 28). In 1998, the SPL line from the picklers was upgraded to double wall piping.

DESCRIPTION OF RELEASES: There have been eleven documented spills of SPL associated primarily with pipeline leaks between the pickler building and the SPL Tank Farm. During each release event, the spill was contained and the free liquids were recovered by utilizing vacuum truck(s). The impacted soils were excavated and mixed with soda ash and lime to neutralize the low pH. After neutralization, waste characterization samples were collected and the soils were removed for off-site disposal. Since 1998, the pipeline was upgraded, to minimize leaks and spills.

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: Based upon the engineering controls, there appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

ARMCO Steel Corporation - Drawing Number 665760 “Pollution Abatement- Pickling Waste Disposal”, August 23, 1967.

ARMCO Inc. - Drawing Number 665852 “Pickling Waste Disposal, SPL Control Diagram”, December 19, 1967.

ARMCO Inc. - Drawing Number 665853 “Pickling Waste Disposal, Pickle Rinse Water Control Diagram”, December 19, 1967.

ARMCO Steel Corporation – Drawing Number 577821 “10,600 Waste Acid Storage Tank”, March 29, 1973.

ARMCO Steel Corporation - Drawing Number 578344 “Drainage Trenches”, November 22, 1974.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency, December 1992.

SWMU 34 – Spent Pickle Liquor Filtration System

UNIT DESCRIPTION: The Spent Pickle Liquor (SPL) is filtered through a diatomaceous earth pre-coated filter, prior to being injected into the subsurface using either the Eastern or Western Pickle Liquor Injection Well (HWMU 1 or HWMU 2). SPL filter drainings from the Filtration System is pumped into the South Terminal WWTP. The filtration system generates a sludge that drains into a concrete sump. A backup filtration system replaces the primary filter system during operation and maintenance periods.

MATERIALS MANAGED: SPL is categorized as EPA hazardous waste number K062. K062 is SPL generated by steel finishing operations of facilities within the iron and steel industry. SPL is an acidic solution comprised of hydrogen chloride and ferrous chloride.

LOCATION: The SPL Filtration System is located inside a building at the South Terminal Wastewater Treatment Plant (SWMU 28).

PERIOD OF OPERATION: The SPL Filtration System has been operating since approximately 1970 and is currently active.

CURRENT WASTE MANAGEMENT DESCRIPTION: During operation and maintenance periods, sludge generated from the SPL Filtration System is drained to a concrete sump. The filtration system sludge is treated through the South Terminal WWTP (SWMU 28) and the resultant sludge is transported to an off-site disposal facility. According to the 1992 Preliminary Review / Visual Site Inspection (PR/VSI) report, the sludge was listed as non-toxic for metals. The sludge generated by the filtration system is also categorized as EPA hazardous waste number K062. However, in accordance to code of federal regulations (CFR) 40 CFR 261.3 (ii) (A), the waste is exempted. The sludge is classified as non-hazardous waste based upon the waste characteristic analytical reports.

ENGINEERED CONTROLS: The SPL Filtration System is periodically checked and the filter is cleaned with the back-up filter put into service during this period. The SPL Filtration System is inside a building on a concrete floor.

DESCRIPTION OF RELEASES: There are no documented releases related to this operation.

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: Based upon the engineering controls, there appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

ARMCO Steel Corporation Number 665851 “Spent Pickle Liquor-Control Diagram”, December 19, 1967.

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency, December 1992.

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HWMU 1 – Eastern Spent Pickle Liquor Injection Well (SWMU 35)

UNIT DESCRIPTION: The eastern spent pickle liquor (SPL) injection well #2 (formerly SWMU 35 in the PR/VSI report) is a Class I hazardous injection well, regulated by the Ohio EPA's Underground Injection Control (UIC) program, under permit number UIC 05-09-002-PTO-I.

MATERIALS MANAGED: SPL is EPA hazardous waste number K062. SPL is generated by steel finishing operations of facilities within the iron and steel industry. SPL is an acidic solution comprised of hydrogen chloride and ferrous chloride. The SPL is staged in storage tanks in the Spent Pickle Liquor Tank Farm (SWMU 33), where it is passes through the Spent Pickle Liquor Filtration System (SWMU 34) and is transported via aboveground double wall piping, prior to being injected into the deep injection wells.

LOCATION: The eastern SPL injection well or injection well #2 is located in the South Plant.

PERIOD OF OPERATION: The injection of SPL began in 1969 and is currently in operation. AK Steel received a permit from the Ohio EPA UIC in 1986.

CURRENT WASTE MANAGEMENT DESCRIPTION: SPL is continuously being injected in this location.

ENGINEERED CONTROLS: The injection well is one of the two injection wells that dispose SPL by deep injection. The injection well is approximately 3,300 feet deep and has a capacity of $5.8x10^8$ gallons. The injection well is periodically checked by plant personnel for potential leakage. The SPL injection operations are inspected semi-annually by Ohio EPA representative, and semi-annually compliance monitoring is conducted in the water from the lowermost underground source of drinking water (USDW). In 1998, the SPL line from the picklers was upgraded to double wall piping

DESCRIPTION OF RELEASES: On January 26, 1998, approximately 150 gallons of SPL was released on the ground near the Injection Well #2. During the release, the spill was immediately contained in a drainage ditch, where free liquids were removed by a vacuum truck and the impacted soils were treated by mixing lime and soda ash (neutralization). After neutralization, the soils were removed for off-site disposal. .

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: Based upon the engineering controls, there appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel Drawing Number 665851 "Spent Pickle Liquor-Control Diagram", December 19, 1967.

AK Steel Drawing Number 665710 "Pollution Abatement- Pickling Waste Disposal", July 29, 1968.

AK Steel Drawing Number 704503 "Spent Pickle Liquor Line Replacement", October 18, 1997.

AK Steel Drawing Number 704504 "Spent Pickle Liquor Line Replacement", October 21, 1997.

AK Steel Drawing Number 704509 "Spent Pickle Liquor Line Replacement", October 31, 1997.

AK Steel Drawing Number 704510 "Spent Pickle Liquor Line Replacement", November 7, 1997.

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency. December 1992.

HWMU 2 – Western Spent Pickle Liquor Injection Well (SWMU 36)

UNIT DESCRIPTION: The western spent pickle liquor (SPL) injection well #1 (formerly SWMU 36 in PR/VSI report) is a Class I hazardous injection well, regulated by the Ohio EPA's Underground Injection Control (UIC), under permit number UIC 05-09-001-PTO-I.

MATERIALS MANAGED: SPL is EPA hazardous waste number K062. SPL is generated by steel finishing operations of facilities within the iron and steel industry. SPL is an acidic solution comprised of hydrogen chloride and ferrous chloride. The SPL is staged in storage tanks in the Spent Pickle Liquor Tank Farm (SWMU 33), where it is passes through the Spent Pickle Liquor Filtration System (SWMU 34) and is transported via aboveground double wall piping, prior to being injected into the deep injection wells.

LOCATION: The western SPL injection well or injection well #1 is located in the South Plant.

PERIOD OF OPERATION: The injection of SPL began in 1969 and currently in operation. AK Steel received a permit from the Ohio EPA UIC in 1986.

CURRENT WASTE MANAGEMENT DESCRIPTION: SPL is continuously being injected in this location.

ENGINEERED CONTROLS: The injection well is one of the two injection wells that dispose SPL by deep injection. The injection well is approximately 3,300 feet deep and has a capacity of 5.8×10^{8} gallons. The injection well is periodically checked by plant personnel for potential leakage. The SPL injection operations are inspected semi-annually by Ohio EPA representative, and semi-annually compliance monitoring is conducted in the water from the lowermost underground source of drinking water (USDW). In 1998, the SPL line from the picklers was upgraded to double wall piping.

DESCRIPTION OF RELEASES: On February 16, 1993 and March 3, 1998, approximately 3,800 and 200 gallons of SPL was released on the ground near the Injection Well #1, respectively. During each release, the spill was immediately contained in a drainage ditch, where free liquids were removed by a vacuum truck and the impacted soils were treated by mixing lime and soda ash (neutralization). After neutralization, the soils were removed for off-site disposal.

PREVIOUS INVESTIGATIONS: There have been no previous investigations.

DATA GAPS: Based upon the engineering controls, there appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

AK Steel Drawing Number 665851 “Spent Pickle Liquor-Control Diagram”, December 19, 1967.

AK Steel Drawing Number 665710 “Pollution Abatement- Pickling Waste Disposal”, July 29, 1968.

AK Steel Drawing Number 704503 “Spent Pickle Liquor Line Replacement”, October 18, 1997.

AK Steel Drawing Number 704504 “Spent Pickle Liquor Line Replacement”, October 21, 1997.

AK Steel Drawing Number 704509 “Spent Pickle Liquor Line Replacement”, October 31, 1997.

AK Steel Drawing Number 704510 “Spent Pickle Liquor Line Replacement” November 7, 1997.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO); Middletown Plant, Middletown, Ohio; OHD004234480. U.S. Environmental Protection Agency. December 1992.

SWMU 37 – Solid Waste Transfer Area

UNIT DESCRIPTION: The former Solid Waste Transfer Area consisted of a 200-yard by 200-yard chain-link fenced area which accumulated solid wastes before disposal or recycling. The transfer area was unlined. The Solid Waste Transfer Area accepted wastes from throughout the plant including discarded materials, such as paper trash, scrap metals, drums, oil-contaminated soils, grease, railroad ties, and general refuse. During the 1991 Preliminary Review / Visual Site Inspection (PR/VSI) visit, an area was designated in the Solid Waste Transfer Area for disposal of material off-site at a landfill. The wastes were loaded on a daily basis by an outside contractor for recycling or disposing into an off-site landfill. The outside contractor would sample drums for waste characterization before disposal. Oil-contaminated soils accumulated in the Solid Waste Transfer Area were containerized, sampled and disposed of off-site by an outside contractor.

MATERIALS MANAGED: The Solid Waste Transfer Area accepted wastes from throughout the plant including paper trash, scrap metals, drums, oil-contaminated soils, grease, railroad ties, and general refuse.

LOCATION: The Solid Waste Transfer Area is located at the south-central portion of the South Plant.

PERIOD OF OPERATION: The Solid Waste Transfer Area was first used in the 1980s. During the PR/VSI the area was regulated under Ohio EPA solid waste requirements. Currently the unit is inactive.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently the Solid Waste Transfer Area is grass covered and used for a contractor staging area.

ENGINEERED CONTROLS: The Solid Waste Transfer Area is surrounded by a chain-link fence, with access for trucks to load and unload. The Solid Waste Transfer Area was unlined.

DESCRIPTION OF RELEASES: No releases have been documented in the Solid Waste Transfer Area. During the PR/VSI surface staining of soils were present in this area.

PREVIOUS INVESTIGATIONS: There is no documentation of any previous investigations at the Solid Waste Transfer Area.

DATA GAPS: The release potential into the environment has not been assessed, due to the management of waste materials is considered a data gap.

INFORMATION SOURCES:

Chirlin, Gary, R. Ph.D., P.E., Expert Report: Surface-Water and Ground-Water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

PRC, Preliminary Review / Visual Site Inspection American Rolling Mill Company (ARMCO), Middletown Plant, Middletown, Ohio; OHD004234480. Prepared for the U.S. Environmental Protection Agency. December 11, 1992.

SWMU 50 – Former Slag Processing Area

UNIT DESCRIPTION: The Former Slag Processing Area was previously used for an undetermined period of time to manage slag. In general the management of slag would be similar to current operations in the Slag Processing Area. The Former Slag Processing Area can be identified on a 1956 aerial photograph.

MATERIALS MANAGED: Slag was managed in this area. Slag primarily contains iron.

LOCATION: The Former Slag Processing Area is located in the southwestern portion of the South Plant.

PERIOD OF OPERATION: The Slag Processing Area was used in the mid 1950s to early 1960s. By approximately 1965, slag was managed in the current Slag Processing Area.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Former Slag Processing Area is currently an undeveloped, grass covered area.

ENGINEERED CONTROLS: It is unknown if engineered controls were in place at the Former Slag Processing Area.

DESCRIPTION OF RELEASES: There are no documented releases at the Former Slag Processing Area.

PREVIOUS INVESTIGATIONS: No previous investigations were conducted at the Former Slag Processing Area.

DATA GAPS The release potential into the environment has not been assessed, due to the management of slag materials is considered a data gap.

INFORMATION SOURCES:

Aerial Photograph 1956, Ohio Department of Transportation (ODOT).

Aerial Photograph 1961, Ohio Department of Transportation (ODOT).

Interviews with AK Steel employees, 2006.

AOC 22 – Dredge Spoil Fill Area near corner of Jackson Lane and Lefferson Road

UNIT DESCRIPTION: The Dredge Spoil Fill Area is located in the northwest corner of the South Plant. Currently this area is used for an employee parking lot. The Dredge Spoil Fill Area was an irregular rectangular fill area approximately 600 feet long by 350 feet wide. A total surface area of approximately 200,000 square feet was designated as the dredge spoil fill area according to AK Steel drawings. This Dredge Spoil Fill Area was designated to be used for the soil removed during channelization activities in Dicks Creek. Dicks Creek was channelized by the U.S. Army Corps of Engineers in 1966. Aerial photographs from 1962, prior to the channelization of Dicks Creek, appear to indicate that this area was a vegetated field. Aerial photographs taken in 1968 after channelization appear undistinguishable from the 1962 aerial photograph and suggest that the area was undisturbed during the time in which Dicks Creek was channelized.

MATERIALS MANAGED: Through aerial photograph research, it appears that while this area was designated to receive dredge spoils associated with the channelization of Dicks Creek, the area never accepted any of these soils; therefore, no materials were managed at this location.

LOCATION: The Dredge Spoil Fill Area is located in the northwest corner of the South Plant.

PERIOD OF OPERATION: The area was designated to receive dredge spoils associated with the channelization of Dicks Creek in 1966. Aerial photographs indicate that the area never accepted any of these soils.

CURRENT WASTE MANAGEMENT DESCRIPTION: No wastes are currently managed at this AOC. It contains grass covered areas and asphalt paved parking lots.

ENGINEERED CONTROLS: No engineering controls are associated with the Dredge Spoil Fill Area.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Dredge Spoil Fill Area.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred into the Dredge Spoil Fill Area.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

Aerial Photograph 1962, Butler County Soil and Water Conservation District.

Aerial Photograph 1968, Butler County Soil and Water Conservation District.

AK Steel Drawing Number SK-1278C, “Plot Plans”, January 24, 1967.

AOC 23 – Dredge Spoil Fill Area near corner of Oxford State Road and North Branch of Dicks Creek

UNIT DESCRIPTION: The Dredge Spoil Fill Area is located in the southeast corner of the South Plant. This AOC is approximately 800 feet by 800 feet and contains several grass covered hills, a pond, and uncovered fill areas. A total surface area of approximately 650,000 square feet was designated as the dredge spoil fill area according to AK Steel Drawings. This Dredge Spoil Fill Area was designated to be used for the soil removed during channelization activities in Dicks Creek. Dicks Creek was channelized by the U.S. Army Corps of Engineers in 1966. Dicks Creek was channelized by the U.S. Army Corps of Engineers in 1966. Aerial photographs from 1962, prior to the channelization of Dicks Creek, appear to indicate that this area was a farm field. Aerial photographs taken in 1968 after channelization appear to indicate that several piles of soil, presumably of dredge spoils associated with the channelization, appear to be stock-piled in this area. A main dirt road leads to this area with several secondary roads leading to each pile. In 1992 this area accepted excavated soil associated with the construction of the Electrogalvanizing Plant located in the western portion of the South Plant.

MATERIALS MANAGED: The Dredge Spoil Fill Area appears to contain dredge spoil fill associated with the channelization of Dicks Creek. Dredge spoil fill may contain polychlorinated biphenyls (PCBs). In addition this area contains fill material debris from construction of the Electrogalvanizing Plant in 1992. Asphalt chunks are visible.

LOCATION: The Dredge Spoil Fill Area is located in the southeast corner of the South Plant.

PERIOD OF OPERATION: The area was designated to receive dredge spoils associated with the channelization of Dicks Creek in 1966. Aerial photographs indicate that this area was used for stock-piling soils during this time period. Additionally, fill material debris associated with the construction of the Electrogalvanizing Plant was placed at this location in 1992.

CURRENT WASTE MANAGEMENT DESCRIPTION: The area contains several grass covered hills, a pond, and uncovered fill areas. The origin of the fill is most likely associated with the channelization of Dicks Creek in 1966 and the construction of the Electrogalvanizing plant in 1992.

ENGINEERED CONTROLS: No engineering controls are associated with the Dredge Spoil Fill Area.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Dredge Spoil Fill Area.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred into the Dredge Spoil Fill Area.

DATA GAPS: The release potential into the environment has not been assessed, due to the management of suspected PCB impacted sediments/soils from Dicks Creek channelization is considered a data gap.

INFORMATION SOURCES:

Aerial Photograph 1962, Butler County Soil and Water Conservation District.

Aerial Photograph 1968, Butler County Soil and Water Conservation District.

Interview with AK Steel plant employee, 2006.

AOC 24 – Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from the North Branch of Dicks Creek to Jackson Lane Ditch (4000')

UNIT DESCRIPTION: The Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from the North Branch of Dicks Creek to Jackson Lane Ditch is located on the southern border of the South Plant. Currently this area is grass covered. This Dredge Spoil Fill area was a narrow long fill area of approximately 4,000 feet to 5,000 feet in length. A total surface area of approximately 200,000 square feet was designated to be used for the soil removed during channelization activities in Dicks Creek. Dicks Creek was channelized by the U.S. Army Corps of Engineers in 1966. Aerial photographs from 1962, prior to the channelization of Dicks Creek, appear to indicate that this area was a grass field. Aerial photographs taken in 1968 after channelization appear undistinguishable from the 1962 aerial photographs and suggest that the area was undisturbed during the time in which Dicks Creek was channelized.

MATERIALS MANAGED: Through aerial photograph research, it appears that while this area was designated to receive dredge spoils associated with the channelization of Dicks Creek, the area never accepted any of these soils; therefore, no materials were managed at this AOC.

LOCATION: The Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from the North Branch of Dicks Creek to Jackson Lane Ditch is located on the southern boundary of the South Plant.

PERIOD OF OPERATION: The area was designated to receive dredge spoils associated with the channelization of Dicks Creek in 1966. Aerial photographs indicate that the area never accepted any of these soils.

CURRENT WASTE MANAGEMENT DESCRIPTION: No wastes are currently managed at this AOC. Currently this area is grass covered.

ENGINEERED CONTROLS: No engineering controls are associated with the Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from the North Branch of Dicks Creek to Jackson Lane Ditch.

DESCRIPTION OF RELEASES: There is no documentation of any releases associated with the Dredge Spoil Fill Area on the north side and parallel to Oxford State Road running from the North Branch of Dicks Creek to Jackson Lane Ditch.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred into the Dredge Spoil Fill Area.

DATA GAPS: There appears to be no data gaps at this SWMU.

INFORMATION SOURCES:

Aerial Photograph 1962, Butler County Soil and Water Conservation District.

Aerial Photograph 1968, Butler County Soil and Water Conservation District.

Slag Processing Area

SWMU 38 – Closed Solid Waste Landfill by Yankee Road and Dicks Creek

UNIT DESCRIPTION: The Closed Solid Waste Landfill by Yankee Road and Dick's Creek (Landfill) is an unlined cell that covers approximately 14 acres. Waste placement extended to Monroe Ditch on the southern and western sides and to the bank of the Dicks Creek flood plain to the north.

MATERIALS MANAGED: According to Dr. Chirlin, the area of the Solid Waste Landfill north of Monroe Ditch was used in 1966 as a staging area to support channelization of Dicks Creek. Solid wastes were not deposited until sometime after 1973 based on aerial photographs. In addition the aerial photographs indicate that the Landfill was used to store solid wastes. Wastes placed in the Landfill included construction debris and residual wastes from steel-making operations. Operational wastes included Basic Oxygen Furnace (BOF) air pollution control dust, scrubber sludges, and wastewater treatment sludges from the blast furnace, sinter plant, BOF, hot strip mill, north and south terminal treatment plants, and water softening plants. According to Dr. Chirlin some pits were dug in which to dispose of blast furnace wastes.

LOCATION: The Landfill is located in the northwest section of the Slag Processing Area, near the intersection of Yankee Road and Dicks Creek. The Closed CERCLA Notification Waste Landfill (SWMU 39) is located to the south, where Monroe Ditch, bisects the two landfills. Monroe Ditch then turns north until emptying into Dicks Creek. Monroe Ditch defines the boundaries south and east of the closed Landfill.

PERIOD OF OPERATION: According to Dr. Chirlin the Landfill was used as a staging area in 1966 to support the channelization of Dicks Creek. Sediment was dredged from the creek and placed on the northern portion of the landfill. Placement of solid waste was in the landfill was sometime after 1973 based on aerial photographs. The Landfill underwent closure in 1980.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Landfill is no longer in use.

ENGINEERED CONTROLS: During closure the waste was regraded and a minimum of 2-feet of compacted clay with a vegetated soil cover was emplaced over the waste. Currently, the Landfill is inspected and the vegetative cover is mowed periodically.

DESCRIPTION OF RELEASES: There are no documented releases associated with the Landfill.

PREVIOUS INVESTIGATIONS: Soil boring and monitoring well MDA-36S was installed in 2001 in the northwestern corner of the Landfill area, near the confluence of Monroe Ditch and Dicks Creek to monitor the groundwater downgradient from the Landfill. PCBs were detected in the soils sampled during installation of this monitoring well, but the subsequent groundwater sampling event indicated no detectable concentration of PCBs. Laboratory analytical results are included in Appendix E.

In November 2007, five boreholes (ISB-15 through ISB-19) and two geotechnical boreholes were advanced in Landfill SWMU 38. From each borehole, continuous samples were advanced through the landfill cap, the waste material, and then terminated below the waste/native soil interface. The total depths for boreholes ISB-15 through ISB-19 were 32, 33, 30, 25, and 37 feet bls, respectively. No saturation conditions were encountered from any of the boreholes; therefore, no leachate monitoring wells were installed in Landfill SWMU 38. During the drilling activities, damp to moist conditions were encountered in the waste interval, but no measurable quantities were documented. At borehole locations ISB-16 and ISB-17, refusal was encountered at 28 feet bls. The borings were moved approximately 10 feet west and redrilled to complete the borings to the appropriate depth.

The landfill cap and the native soils beneath the waste consist predominantly of silty clays, except soil borings ISB-18 and ISB-19, where silt was observed beneath the waste. The landfill cap ranged from 2 to 5 feet thick. The waste material from all the boreholes consisted of black silts, clays, sands, and gravels (slag) with occasional white and/or red striations in the clays/silts intervals. In addition, large pieces of steel were encountered. Detailed descriptions of each borehole are presented in the soil boring logs (Appendix D).

DATA GAPS: The release potential will be assessed during the RFI.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. March 11, 2004.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

SWMU 39 – Closed CERCLA Notification Solid Waste Landfill (includes former ponds west Of Monroe Ditch)

UNIT DESCRIPTION: The Closed CERCLA Solid Waste Landfill (Landfill) is an un-lined cell that is approximately 31 acres. AK Steel began disposing of waste in the Landfill in April 1965, where waste placement extended to Monroe Ditch on the northern and eastern sides and the Former Ponds West of Monroe Ditch on the western side. Aerial photographs indicate there were as many as 17 ponds located in the landfill.

MATERIALS MANAGED: The Landfill is comprised of construction debris, paper trash, tars, slag, and steel making sludge. Slag was also used as fill material and to stabilize the work in the Landfill. Specifically, the Landfill contains an unknown quantity of tar decanter sludge (K087), open hearth wastewater sludges, oily solid wastes, air pollution control dust scrubber sludges, and wastewater treatment plant sludges. Some Landfill cells contained only tar waste. Several wastewater management ponds were located in the southwestern portion of the southern landfill. Managed wastewaters included wastewater generated during tank, vat, or sump cleaning operations. The wastewaters were placed in the ponds to allow separation of oils and solids from the water and oils were periodically reclaimed. During closure, pond oil samples were collected and were not found to contain polychlorinated biphenyls (PCBs).

LOCATION: The Landfill is located in the southwest portion of the Slag Processing Area. The Landfill is bordered to the north and east by Monroe Ditch and to the south and west by railroad tracks (raised abutment). The Former Ponds are located in the west and southwest portion of the Landfill.

PERIOD OF OPERATION: The Landfill and Former Ponds began operation in 1973 and were closed in 1980.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Landfill is no longer in use.

ENGINEERED CONTROLS: Prior to closure in 1980, wastes from selected Former Ponds containing oil derivatives were burned and the others were stabilized by inert materials. Prior to backfilling activities the ponds were dewatered. The ponds were then backfilled with material from the high points within the Landfill. The grading activities resulted in an asymmetrical configuration for the closed Landfill. Once grading activities were complete, a cap comprised of a minimum of 2-feet of compacted clay with a vegetated soil cover was emplaced over the waste. Currently, the Landfill is inspected and the vegetative cover is periodically mowed.

DESCRIPTION OF RELEASES: Based on historical site investigations, a suspected PCB source was identified in the landfill.

PREVIOUS INVESTIGATIONS: In 1989, monitoring well GM-36S was installed on the west side of the Landfill, in order to characterize site wide groundwater conditions at AK Steel. The groundwater level measurement is collected twice a year as part of the semi-annual site wide groundwater monitoring program. In 1998, 1999 and 2001, groundwater samples were collected from GM-36S and no PCBs were detected.

In 2001, monitoring wells MDA 31S, MDA 35S, MDA-35SR, MDA 33S and MDA 34P were installed around the perimeter of the Landfill. High concentrations of methane gas were encountered during the installation of monitoring well MDA 31S and MDA 35S located in the northwest section of the Landfill. MDA 35SR was moved to a new location, where the well was successfully installed, while the boring for MDA-31S was eventually abandoned. Monitoring wells MDA 33S and MDA 34P were installed on the east side of the landfill adjacent to Monroe Ditch. MDA 33S was installed in the upper aquifer and well MDA 34P was installed in the perched zone. Non-aqueous phase liquid (NAPL) was documented from MDA 33S. Laboratory analytical results confirmed that PCBs were present in MDA-33S. Laboratory analytical results are included in Appendix E.

The objective of IM 3 is the delineation, containment and recovery of free product in the vicinity of Monitoring Well MDA-33S. This monitoring well is located adjacent to Monroe Ditch, at the edge of SWMU 39 (Closed CERCLA Notification Solid Waste Landfill). The location, mobility, and chemical and physical properties of the free product in the vicinity of MDA-33S were determined through the investigation of the Upland Sources Sampling and Analysis Plan, Revision 4 (ENVIRON 2007b) from June through December 2007. Due to concerns of United States et al., a supplemental investigation was conducted in spring 2008 (installation of borings MDA-33S - N200/N150/N100/N75/N50/S100/S200/S300/S350/S375/S400 and wells N100/N75/N50/S40/S350/S375/S400). The data gathered from these investigations (ENVIRON 2008b) served as inputs to the engineering design to contain and treat the free product and other contaminants of concern. ENVIRON presented this design in the MDA-33S and Monroe Ditch Remediation Design Document (ENVIRON 2010). The proposed containment system will consist of a hydraulic barrier, a physical barrier, and a treatment system that will prevent the additional discharge of free product, PCBs, and other contaminants of concern to Monroe Ditch.

In February 2008, five borings were converted to monitoring wells (MDE-01 through MDE-05) to define the northeast portion of SWMU 39 (Appendix D).

In November and December 2007 and January 2008, fourteen boreholes (ISB-1 through ISB-14) and five geotechnical boreholes were advanced in Landfill SWMU 39. From each borehole, continuous samples were collected by advancing through the landfill cap, then through the waste material interval, and then terminated below the waste/confining soil interface. The total depths for boreholes ISB-1 through ISB-14 were 17, 40, 17, 25, 17, 27, 25, 30, 45, 60, 50, 60, 55, and 40 feet bls, respectively. Saturation conditions were encountered in all the boreholes and were converted to two-inch diameter stainless steel leachate monitoring wells. The saturation zone from each borehole was located at the waste and confining layer interval. The boreholes were advanced at a minimum of 1 foot beyond the saturation zone into the confining layer to create a sump for the liquids in the wells.

The landfill cap and the native soils beneath the waste consist of silty clays. The landfill cap ranged from 2 to 7 feet thick. The waste material from all the boreholes consisted of black silts, clays, sands, and gravels (slag) with debris imbedded in the soils. The debris included wood, brick, plastic, paper, cloth, and metal fragments. The native soil beneath the waste consists of a hard cohesive clay material. Detailed descriptions of each borehole and leachate well construction details are presented in the soil boring logs (Appendix D).

In February 2008, five borings were converted to monitoring wells (MDE-01 through MDE-05) to define the northeast portion of SWMU 39 (Appendix D).

DATA GAPS: The release potential will be assessed during the RFI.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

ENVIRON. 2007b. Upland Sources Sampling and Analysis Plan, Revision 4. June 2007.

ENVIRON. 2008b. Addendum to Upland Sources Sampling and Analysis Plan Rev. 4: Installation of Additional Monitoring Wells Adjacent to Monroe Ditch AK Steel, Middletown, Ohio. May 14, 2008.

ENVIRON. 2010. MDA-33S and Monroe Ditch Remediation Design Document. January 2010.

Geraghty & Miller, Inc., Investigation of Ground-Water Flow Conditions at the ARMCO Plant, Middletown, Ohio. May 1989.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

SWMU 40 – Closed Solid Waste Landfill on West Side of Slag Processing Area

UNIT DESCRIPTION: The Closed Solid Waste Landfill (Landfill) consists of an unlined cell that covers approximately 3 acres. Waste placement extended in a small area located in the south side of the Slag Processing Area.

MATERIALS MANAGED: According to the PR/VSI the Landfill consists of primarily slag, soils from new facility construction excavations, rubble, trash, blast furnace dust and may contain various plant wastewater treatment sludges. In addition solid waste was placed in the landfill. According to Dr. Chirlin, waste was placed in open piles and excavated pits at the landfill.

LOCATION: The Landfill is located between the access road and Monroe Ditch. It is located west of Mill Scale Area 3 (AOC 13).

PERIOD OF OPERATION: The Landfill began operation in 1965 and closed in 1980.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Landfill is no longer in use.

ENGINEERED CONTROLS: During closure the waste was regarded and a minimum of 2-feet of compacted clay with a vegetated soil cover was emplaced over the waste. According to AK Steel CERCLA notification was made to the EPA in the early 1980s associated with the closure of this landfill. Currently, the landfill is inspected and the vegetative cover is mowed periodically.

DESCRIPTION OF RELEASES: There are no documented releases associated with the Landfill.

PREVIOUS INVESTIGATIONS: In June 1998 soil borings BH-07, BH-08, and BH-09 were advanced in the north, central, and southern portions of the landfill, respectively. Soil borings BH-08 and BH-09 were converted to nested wells. Perched zone monitoring wells (MDA-08P and MDA-09P) and upper aquifer monitoring wells (MDA-08S and MDA-09S) were installed at boring locations BH-08 and BH-09, respectively. Polychlorinated biphenyls (PCBs) were detected in the soils from soil borings BH-08 and BH-09. During the 1998 groundwater sampling event, PCBs were detected in monitoring wells MDA-08P and MDA-08S. During the 2001 groundwater sampling event, PCBs were not detected.

In August 2000, supplemental soil borings (BH07-E50, BH07-S50, BH07-SE25, and BH07-W50) were advanced in the vicinity of soil boring BH-07. Soil borings (BH08-W50N, BH08-W50S, BH08-W60, and BH08-W65) were advanced in the vicinity of soil boring BH-08. PCBs were detected in the soils in all the soil borings, except for soil boring BH07-E50.

In September 2001, supplemental soil borings (BH07-01, BH08-01, BH08-1A and BH08-02) were advanced in the vicinity of the original boring locations BH-07 and BH-08. PCBs were detected in the soils in all soil borings. Laboratory analytical results are included in Appendix E.

Soil remediation at location BH-08 (IM 5) entailed delineation, excavation, and disposal of contaminated soils containing more than 25 mg/kg PCBs in the vicinity of AK Steel soil boring BH-08 and restoration of the excavated area. This historical soil boring is located at the northern edge of SWMU 40 (Closed Solid Waste Landfill on West Side of Slag Processing Area). Soil sampling activities were conducted in June 2007 under the Upland Sources Sampling and Analysis Plan, Revision 4 (ENVIRON 2007b). Based on the results of this investigation (ENVIRON 2008c), ENVIRON developed the Upland Sources Remediation Design Document (ENVIRON 2008d), describing in detail the methods that were to be used to remove and dispose of contaminated soil. Remediation and restoration activities were completed in summer 2008, as documented in the Upland Soil Remediation Completion Report

(ENVIRON 2008e). United States et al. acknowledged completion of these activities in November 2008.

DATA GAPS: The potential release into the environment, due to the management of suspected PCB material in the landfill is considered a data gap.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

ENVIRON. 2007b. Upland Sources Sampling and Analysis Plan, Revision 4. June 2007.

ENVIRON. 2008c. Data Summary Report: Upland Soil (SS-01 and BH-08). January 2008.

ENVIRON. 2008d. Upland Soil Remediation Design Document. May 2008.

ENVIRON. 2008e. Upland Soil Remediation Completion Report. October 2008.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

SWMU 41 – Closed Solid Waste Landfill West of Slag Processing Area Access Road

UNIT DESCRIPTION: The Closed Solid Waste Landfill West of the Slag Processing Area Access Road (Landfill) consists of two distinct unlined cells and covers approximately 14 acres.

MATERIALS MANAGED: The Landfill contains predominately wastewater treatment sludges from the BOF, South Terminal, and Hot Strip Mill wastewater treatment plants. In addition dust from the blast furnace, BOF, and Hot Strip Mill were also disposed of in this Landfill. The waste was disposed of in open piles and excavated pits.

LOCATION: The Landfill is located in the northeast section of the Slag Processing Area, west of the Slag Haul Road, where Dicks Creek borders the north.

PERIOD OF OPERATION: Based on the 1982 aerial photograph, the Landfill appeared to be grass covered; therefore, assumed to be closed.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Landfill is no longer in use.

ENGINEERED CONTROLS: During closure the waste was regraded and a minimum of 2-feet of compacted clay with a vegetated soil cover was emplaced over the waste. Currently, the landfill is inspected and the vegetative cover is mowed periodically.

DESCRIPTION OF RELEASES: There are no documented releases associated with the Landfill. However, the PR/VSI report indicated seeps from the Landfill were observed entering Dicks Creek on the north side of the Landfill.

PREVIOUS INVESTIGATIONS: Upper aquifer monitoring well GM-30S and deep aquifer monitoring well GM-30D are located south of the Landfill near Slag Haul Road. Both wells were installed in 1988, as part of the investigation of the groundwater flow conditions of AK Steel. No polychlorinated biphenyls (PCBs) were detected in groundwater in monitoring well GM-30S during the 1998 sampling event.

Laboratory analytical results are included in Appendix E.

DATA GAPS: The potential for a release into the environment is high because the landfill is not lined and is considered a data gap.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Geraghty & Miller, Inc., Investigation of Ground-Water Flow Conditions at the ARMCO Plant, Middletown, Ohio. May 1989.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

ARCADIS

SWMU 42 – Closed Solid Waste Landfill East of Slag Processing Area Access Road

UNIT DESCRIPTION: The Closed Solid Waste Landfill East of the Slag Processing Area Access Road (Landfill) consists of two rectangular unlined cells that cover approximately 20 acres. The wastes arrived by rail.

MATERIALS MANAGED: The Landfill contains predominately wastewater treatment sludges from the Basic Oxygen Furnace (BOF), South Terminal, and Hot Strip Mill wastewater treatment plants. In addition, dust from the blast furnace, BOF, and Hot Strip Mill were also disposed.

LOCATION: The Landfill is located in the northeast section of the Slag Processing Area, east of the Slag Haul Road, where Dicks Creek borders the north. The Landfill is located west of Landfill 1 (SWMU 43).

PERIOD OF OPERATION: AK Steel first began using the landfill in 1980. The landfill was decommissioned between 1989 and 1990.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Landfill is no longer in use.

ENGINEERED CONTROLS: During closure the waste was regraded and a minimum of 2-feet of compacted clay with a vegetated soil cover was emplaced over the waste. The Landfill is periodically checked and the vegetative cover is periodically mowed.

DESCRIPTION OF RELEASES: There are no documented releases associated with the Landfill.

PREVIOUS INVESTIGATIONS: In 1988, monitoring well MW-33S was installed downgradient from the Landfill during the site wide groundwater flow conditions investigation. The monitoring well has been sampled annually for volatile organic compounds (VOCs) since 1988. No VOCs were detected during any annual sampling event.

Laboratory analytical results from the previous investigation (2000-2005) are included in Appendix E.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Geraghty & Miller, Inc., Investigation of Ground-Water Flow Conditions at the ARMCO Plant, Middletown, Ohio. May 1989.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

SWMU 43 – Closed Solid Waste Landfill (Landfill 1)

UNIT DESCRIPTION: The Closed Solid Waste Landfill (Landfill 1) consists of an un-lined cell that comprises approximately 28 acres. The wastes arrived by rail and were covered daily with soil. Unlike the other landfills in the Slag Processing Area, Landfill 1 is regulated under a groundwater monitoring program under the Ohio Administrative Code (OAC) 3745-30-08. Landfill 1 is classified as a Class III residual waste landfill.

MATERIALS MANAGED: Landfill 1 contains predominately sludges from the wastewater treatment plants and dust from the air pollutions controls.

LOCATION: Landfill 1 is located on the eastern edge of the Slag Processing Area. It is located east of the Closed Landfill East of Slag Processing Area Access Road (SWMU 42). It is located south of Dicks Creek, near the confluence of Shaker Creek and Dicks Creek.

PERIOD OF OPERATION: Landfill 1 began operations in 1981 and the closure was completed in 2000 in accordance to OAC 3745-30-09, -10, and -14.

CURRENT WASTE MANAGEMENT DESCRIPTION: Landfill 1 is no longer in use.

ENGINEERED CONTROLS: A closure plan for capping Landfill 1 was submitted in 1997. The cover system contains the following components, in ascending order:

- Intermediate cover layer;
- Recompacted clay barrier layer;
- Synthetic membrane barrier layer;
- Drainage layer;
- Protective cover layer; and
- Vegetative layer.

Landfill 1 is inspected and the cover system and surrounding erosion controls are regularly maintained by AK Steel and the Ohio EPA inspects the landfill annually. Quarterly inspection reports are submitted to the Ohio EPA.

The approved groundwater monitoring program for Landfill 1 includes collecting groundwater samples from the upper aquifer monitoring wells (MW-1S, MW-3S, GM-28S, GM-31S, GM-62S, GM-65S, and GM-66S) semi-annually. After every sampling event, a statistical evaluation report is submitted to the Ohio EPA. In addition, groundwater samples from monitoring wells MW-3S, MW-5S, GM-28S, GM-28D, and GM-33S are sampled for volatile organic compounds (VOCs) annually. No VOCs have been detected from the aforementioned wells.

DESCRIPTION OF RELEASES: There are no documented releases associated with at Landfill 1.

PREVIOUS INVESTIGATIONS: In 1988, monitoring wells from the upper aquifer (GM-28S, GM-31S, GM32S, and GM-33S) and from the lower aquifer (GM-28D) were installed during the site wide groundwater conditions investigation. In 1990, monitoring well MW-1S was installed at the northwest corner of Landfill 1, and from 1993 through 1995, monitoring wells from the upper aquifer (MW-3S, MW-4R, MW-5S, MW-6S, MW-7R, GM-62S, GM-65S), the intermediate aquifer (MW-3I, MW-5I, GM-57I, GM-58I, GM-60I, and GM-63I), and the lower aquifer (GM-57D, GM-58D, and GM-60D) were installed. In 1999, GM-66S was installed upgradient from Landfill 1. The objective of the monitoring well installations was to characterize groundwater quality to assess whether it has been affected by past or present operations. The characterization of groundwater was part of the groundwater monitoring program (OAC 3745-30-08) for Landfill 1. In addition, data from the monitoring well installations were used as part of the permit to install (PTI) for Landfill 1 and the proposed Landfill 2.

Laboratory analytical results (VOCs) from the previous investigation (2000-2005) are included in Appendix E.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

ARCADIS, Revised Groundwater Monitoring Plan, Residual Waste Landfill 1, AK Steel Corporation, Middletown, Ohio. November 2004.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Geraghty and Miller, Closure Plan AK Steel Corporation, Residual Waste Landfill 1, Middletown, Ohio. Volume I. 1997.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

SEC Donohue, Application for Permit To Install Residual Waste Landfill Facility Volume I, ARMCO Steel Company L.P., Middletown, Butler County, Ohio. May 1992.

ARCADIS

SWMU 46 – Current Oil Storage Area

UNIT DESCRIPTION: The Current Oil Storage area consists of five above-ground tanks and several 55-gallon drums which store used waste oil.

MATERIALS MANAGED: Approximately 10,000 pounds of oil and used oil is stored in the Oil Storage Area. The oil is used for lubricating mobile equipment. Used oil is shipped off-site for disposal.

LOCATION: The Current Oil Storage Area is centrally located in the Slag Processing Area. It is approximately 300 feet north of the Slag Processing Area office building.

PERIOD OF OPERATION: It is unknown when the Current Oil Storage Area began service, it is currently active.

CURRENT WASTE MANAGEMENT DESCRIPTION: Castrol Oil products (Castrol Dieselall engine oil, Castrol limited slip gear lubricant, and/or, Castrol Paradene AW hydraulic oil) and used oil are stored in the Oil Storage Area.

ENGINEERED CONTROLS: There are two covered storage areas used for management of the used oils.

DESCRIPTION OF RELEASES: In December 1997 surface staining was present near the tanks and drums. No specific information regarding a direct release is available. In February 16, 2001 an outside contractor removed 24 cubic yards of "oil-contaminated slag" described as "bulk slag contaminated with virgin oils." According to Olympic Mills Service (OMS) personnel the oil release could have been Castrol Diesel all engine oil, Castrol limited slip gear lubricant, and/or, Castrol Paradene AW hydraulic oil.

PREVIOUS INVESTIGATIONS: On December 12, 1997 a waste oil sample was collected and found to not contain polychlorinated biphenyls (PCBs). A boring (BH-20) was completed in the area where oil-stained soil was present. Slag samples collected from BH-10 at 0-2 feet below land surface (bls), 6-8 feet bls, and within native soil at 8-9 feet bls did not contain PCBs. A perched groundwater zone was not detected in the soil boring; therefore no monitor well was installed.

Laboratory analytical results are included in Appendix E.

DATA GAPS: The potential release into the environment, due to the management of oils in this area is considered a data gap.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Spurlock, Greg, RUMPKE, Facsimile. February 26, 2001.

Strong, Jon, Olympic Mills Services, "MSDS Sheets." February 15, 2001.

SWMU 47 – Former Oil Separator Ponds and vicinity

UNIT DESCRIPTION: The Former Oil Separator Ponds (Ponds) were first identified in a 1966 aerial photograph of the site. The Ponds consisted of three former rectangular ponds, two smaller rectangular ponds, and smaller circular ponds. According to resources, it is thought that the liquids from the ponds were generated during tank, vat, or sump cleaning operations. During periods of high precipitation events, the ponds could overflow into the Former Drainage Path (AOC 17) on the southern boundary of the property adjacent to the railroad tracks.

MATERIALS MANAGED: It is suspected that liquids generated during tank, vat, and/or sump cleaning operations were managed in these sets of ponds. Based upon previous investigations, oil derivatives likely containing polychlorinated biphenyls (PCBs) were stored in the ponds.

LOCATION: The Ponds are located in the southeast portion of the Slag Processing Area, near the southern property line.

PERIOD OF OPERATION: While the actual start of operations for these Ponds is unknown, it is likely in the 1965 to 1966 timeframe since this area was identified as farmland in a 1961 aerial photograph, in 1965 McGraw Construction purchased the land and began slag processing activities, and then the Ponds were present in the 1966 aerial photograph. It is believed that these separator ponds continued in operation until 1980. In 1980 the smaller ponds were closed, closure of the three rectangular ponds was delayed until circa 1983.

CURRENT WASTE MANAGEMENT DESCRIPTION: The Ponds have been backfilled and are no longer being used.

ENGINEERED CONTROLS: There do not appear to have been any engineering controls associated with the Ponds.

DESCRIPTION OF RELEASES: There are no documented releases associated with these Ponds. However, these ponds were allowed to overflow to the Former Drainage Ditch (AOC 17) during precipitation events.

PREVIOUS INVESTIGATIONS: In 1980, AK Steel sampled all the Ponds. PCBs concentrations were only detected in the rectangular ponds. Subsequently, the smaller ponds were closed by removing oil and water for off-site recycling and backfilling with clean fill. The closure for the rectangular Ponds was delayed until a strategy for the managing PCBs was developed.

In 1983 the rectangular Ponds were closed by removing PCB-containing liquids, removing/excavating sludge until PCBs were not detected, and backfilling with clean fill. The PCB-containing waste materials from the rectangular ponds were properly managed in accordance with the Toxic Substances Control Act (TSCA) requirements.

In 1998, four soil borings (BH14 through BH17) were advanced at the former Pond locations. PCB concentrations were detected in samples from soil borings BH15 and BH17. The soil borings were converted to monitoring wells (MDA-14S through MDA-17S). No PCBs were detected in the groundwater samples that were collected in 1998 and 2001. In addition, sediment samples (0-2 feet below land surface [bls] and 2-4 feet bls) were collected from the drainage ditch located south and west from the Ponds. No PCBs were detected in these sediment samples.

In 2000, three additional soil borings (BH15-E50, BH15-N50, and BH15-W50) were advanced to further evaluate the horizontal and vertical extent of PCBs detected in boring BH15. Borings were completed 50 feet to the north, east, and west of BH15. Detected concentrations of PCBs were presented in all the borings.

In 2001, seven additional soil borings (BH15-01 through BH15-07) were advanced to further evaluate the horizontal and vertical extent of PCBs detected in the vicinity of BH15. PCB concentrations were present in BH15-01, BH15-01 through BH15-04, and BH15-07. In addition, monitoring well MDA-32S was installed in the vicinity of the former rectangular ponds. PCBs were detected in the soil samples, but no PCBs were detected in the groundwater. Monitoring well MDA-16S was damaged beyond repair; therefore, this well was properly abandoned and replaced with MDA 16SR. No PCBs were detected in the soils from MDA 16SR.

Laboratory analytical results are included in Appendix E.

DATA GAPS: The potential release into the environment, due to the management of PCB material in the ponds is considered a data gap.

INFORMATION SOURCES:

AK Steel Drawing Number 323371, “Oil Ponds General Arrangement”, August 23, 1983.

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

ARCADIS Geraghty and Miller, First Interim Report. July 1999.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

SWMU 48 – Existing Fueling Area in SW part of OMS

UNIT DESCRIPTION: The Existing Fueling Area in the southwest part of the Slag Processing Area consists of one horizontally mounted steel fueling tank, one smaller tank, and the accompanying secondary containment structure. The tanks are currently in use and store diesel and gasoline. The fuel is used for mobile equipment.

MATERIALS MANAGED: The Fueling Area stores diesel and gasoline.

LOCATION: The Existing Fueling Area is located in the southern portion of the Slag Processing Area, just southwest of the maintenance garage.

PERIOD OF OPERATION: It is unknown when the Fueling Area began operating. It is currently active.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently no wastes are managed in the Existing Fueling Area.

ENGINEERED CONTROLS: A steel secondary containment system surrounds the tanks.

DESCRIPTION OF RELEASES: There are no documented releases related to the Existing Fuel Area.

PREVIOUS INVESTIGATIONS: No previous investigation of the Existing Fuel Area has occurred.

DATA GAPS: The potential release into the environment, due to the management of petroleum fuels in this area is considered a data gap.

INFORMATION SOURCES:

Site inspection and interviews with AK Steel employees, 2006.

SWMU 49 – Former Kish Quenching Area

UNIT DESCRIPTION: The Former Kish Quenching Area was located in the central portion of the Slag Processing Area next to the Kish Building. This area was used to quench Kish pots prior to dumping.

MATERIALS MANAGED: Kish pots contained skimmer slag and iron, and had a high iron, graphite, and lime content. During the steel making process, limestone was added to molten iron as a fluxing agent to bring impurities to the surface for skimming at the basic oxygen furnace (BOF). The surface material was then skimmed off into kish pots. Kish pots were quenched prior to dumping to reduce the potential for air borne emissions from the kish pot dumping process.

LOCATION: The Former Kish Quenching Area was located in the central portion of the Slag Processing Area next to the Kish Building.

PERIOD OF OPERATION: According to interviews, the kish quenching process began in April 1997 and was taken out of service in 2000.

CURRENT WASTE MANAGEMENT DESCRIPTION: Former Kish Quenching Area is no longer in use

ENGINEERED CONTROLS: Kish pot quenching was used to reduce air borne emissions during the dumping process. AK Steel and the slag processing companies (OMS/IMS Tube City) have undertaken changes to the kish pot cooling operation since 2000 when an EPA request was made to decrease water usage in the Slag Processing Area. Prior to these changes approximately 75,000 gallons per day were used for kish cooling in the Former Kish Quenching Area.

DESCRIPTION OF RELEASES: There are no documented releases related to the Former Kish Quenching Area. AK Steel had a permit for air emission release during the kish dumping process.

PREVIOUS INVESTIGATIONS: No previous investigations have occurred in the Former Kish Quenching Area.

DATA GAPS: The potential release into the environment, due to the management of PCB material during the former quenching activities is considered a data gap.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Alternatives and Reuse Assessment-Water Use in Slag Processing Operations, Olympic Mills Services Operations Area, AK Steel Middletown, Ohio. February 7, 2002.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

ARCADIS

AOC 11 – Mill Scale Area 1

UNIT DESCRIPTION: Based on boring BH-02 completed in July 1998, mill scale in Mill Scale Area 1 is approximately 10 feet thick. Mill Scale Area 1 is a mill scale management units in the Slag Processing Area and has a surface area of approximately 140,000 square feet. The quantity of mill scale managed in this unit varies daily depending on consumption and accumulation; therefore, volumes of mill scale are approximate values.

MATERIALS MANAGED: Mill scale stockpiled in this location comes from the hot strip mill at AK Steel. Mill scale is an iron oxide scale that forms on the surface of steel when it is rolled. As mill scale forms, it is blown off with a high pressure wash. Oil is used as a lubricant during the rolling process and is commonly found on mill scale when it is dumped at the Slag Processing Area.

LOCATION: Mill Scale Area 1 is located 200 feet east of Monroe Ditch in the northwest portion of the Slag Processing Area. Mill Scale Area 1 is approximately 400 feet south of Dicks Creek and approximately 100 feet east of the Closed Solid Waste Landfill by Yankee Road and Dicks Creek (SWMU 38).

PERIOD OF OPERATION: The current location was used as farmland until 1961 based upon aerial photographs. In 1965 McGraw Construction purchased the land and began slag processing activities. Aerial photographs taken on April 1, 1973 indicate the presence of mill scale in this vicinity. Mill scale produced as a byproduct of AK Steel's steel making processes is currently managed in Mill Scale Area 1.

CURRENT WASTE MANAGEMENT DESCRIPTION: Mill scale produced as a byproduct of AK Steel's steel making processes is currently managed in Mill Scale Area 1.

ENGINEERED CONTROLS: There are no engineering controls in place for the mill scale located in Mill Scale Area 1.

DESCRIPTION OF RELEASES: There are no documented releases in Mill Scale Area 1.

PREVIOUS INVESTIGATIONS: In 1998, soil boring MDA-BH02 was advanced in Mill Scale Area 1. Polychlorinated biphenyls (PCBs) were detected in the soils. Specifically, samples from depths of 0-2 feet below land surface (bls) and 6-8 feet bls exhibited PCB concentrations of 1.37 mg/kg and 1.44 mg/kg, respectively. A native soil sample from a depth of 11-13 ft. bls did not contain PCBs.

Upon completion of the soil boring, it was converted to an upper aquifer monitor well (MDA-02S). No PCBs were detected in monitoring well MDA-02S in 1998.

Laboratory analytical results from the previous investigation are included in Appendix E.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

AOC 12 – Mill Scale Area 2

UNIT DESCRIPTION: Based on borings BH-03, BH-04, and BH-05, mill scale in Mill Scale Area 2 is approximately 12 feet thick. Mill Scale Area 2 is a mill scale management unit in the Slag Processing Area and has a surface area of approximately 180,000 square feet. The quantity of mill scale managed in this unit varies daily depending on consumption and accumulation; therefore volumes of mill scale are approximate values. It is asserted in the Chirlin Report that former ponds were located within Mill Scale Area 2 near the Monroe Ditch seep area during 1980. These ponds might have existed earlier and have been present most recently as 1987. There is little information on these ponds other than they might have been high in lime content.

MATERIALS MANAGED: Mill scale stockpiled in this location comes from the hot strip mill at AK Steel. Mill scale is an iron oxide scale that forms on the surface of steel when it is rolled. As mill scale forms, it is blown off with a high pressure wash. Oil is used as a lubricant during the rolling process and is commonly found on mill scale when it is dumped at the slag processing area.

LOCATION: Mill Scale Area 2 is located approximately 50 feet east of Monroe Ditch in the western portion of the Slag Processing Area.

PERIOD OF OPERATION: The current location was used as farmland until 1961 based upon aerial photographs. In 1965 McGraw Construction purchased the land and began slag processing activities. Aerial photographs taken on April 1, 1973 indicate the presence of mill scale in this vicinity. Mill scale produced as a byproduct of AK Steel's steel making processes is currently managed in Mill Scale Area 2.

CURRENT WASTE MANAGEMENT DESCRIPTION: Mill scale produced as a byproduct of AK Steel's steel making processes is currently managed in Mill Scale Area 2.

ENGINEERED CONTROLS: There are no engineering controls in place for the mill scale located in Mill Scale Area 2.

DESCRIPTION OF RELEASES: There are no documented releases in Mill Scale Area 2.

PREVIOUS INVESTIGATIONS: In 1998, soil boring borings BH-03, BH-04, BH-05, and BH-06 were advanced in Mill Scale Area 2. Polychlorinated biphenyls (PCBs) were detected in the soils. Specifically, samples were collected at each boring location at depths of 0-2 feet below land surface (bls) and 6-8 feet bls, while native soil samples were collected between 12 and 15 feet bls. PCBs were not detected in any of the slag samples from the 0-2 feet bls intervals, nor in three of the 6-8 feet bls intervals. The samples from 6-8 feet bls interval in BH-04 and BH-05 contained PCBs at concentrations at 4.6 mg/kg and 0.884 mg/kg, respectively.

Perched groundwater monitoring well MDA-03P and shallow aquifer monitoring well MDA-03S were installed near boring location BH-03. MDA-03S was sampled in June-July 1998, September 2000, and September 2001, no PCBs were detected during any of these sampling events. MDA-03P was sampled in June-July 1998, September 2000, and September 2001, PCBs were only detected during the June-July 1998 sampling event at a concentration of 0.63 ug/L.

Laboratory analytical results from the previous investigation are included in Appendix E.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

AOC 13 – Mill Scale Area 3

UNIT DESCRIPTION: Mill Scale Area 3 is a mill scale management unit in the Slag Processing Area and has a surface area of approximately 350,000 square feet. Mill Scale Area 3 is divided into two general areas. The first area is the Closed Solid Waste Landfill on West Side of Slag Processing Area (SWMU 40) and the other area is the "bone yard". The "bone yard" is a mill scale management unit, but received the name because the area was previously used to store obsolete equipment. Since the Closed Solid Waste Landfill on West Side of Slag Processing Area (SWMU 40) is already discussed in a SWMU data sheet, the mill scale management activities and former equipment storage conducted in the "bone yard" area will only be discussed in this unit data sheet.

MATERIALS MANAGED: The "bone yard" managed equipment and materials removed from the slag processing plant. Currently, the former "bone yard" is covered with approximately 20 feet of mill scale, steel, slag, and other solid debris, with processing equipment at the surface of the slag pile. Mill scale is stockpiled in the Mill Scale Area 3. Mill scale comes from the hot strip mill at AK Steel. In addition Mill Scale Area 3 also manages purchased mill scale from other steel manufacturers. Mill scale is an iron oxide scale that forms on the surface of steel when it is rolled. As mill scale forms, it is blown off with a high pressure wash.

LOCATION: Mill Scale Area 3 is located in the southwest side of the Slag Processing Area. It borders east of the Closed Solid Waste Landfill on West Side of Slag Processing Area (SWMU 40).

PERIOD OF OPERATION: The current location was used as farmland until 1961 based upon aerial photographs. In 1965 McGraw Construction purchased the land and began slag processing activities. Aerial photographs taken on April 1, 1973 indicate the presence of mill scale in this vicinity. Mill scale produced as a byproduct of AK Steel's steel making processes is currently managed in Mill Scale Area 3. The "bone yard" began operation sometime prior to April 1, 1973 and was no longer used in 1980.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently, the former "bone yard" is covered with approximately 20 feet of mill scale, steel, slag, and other solid debris, with processing equipment at the surface of the slag pile. Mill scale is currently managed in the Mill Scale Area 3.

ENGINEERED CONTROLS: There are no engineering controls in place for mill scale located in Mill Scale Area 3.

DESCRIPTION OF RELEASES: There are no documented releases associated with the Mill Scale Area 3.

PREVIOUS INVESTIGATIONS: In 1998, soil boring borings BH-10, BH-11, BH-12, and BH-13 were advanced in the Mill Scale Area 3. Polychlorinated biphenyls (PCBs) were detected in the soils from soil boring BH-13. In 2000, additional soil borings (BH13-E50, BH13-N50, and BH13-S50) were advanced in the vicinity of soil boring BH-13. PCBs were detected in the soils. In 2001, additional soil borings (BH13-01 through BH13-04) were advanced in the vicinity of soil boring BH-13. PCBs were detected in soil borings BH-13, BH-13-01 through BH-13-04, BH13-E50, BH13-N50 and BH13-S50.

Grab samples of perched groundwater were collected in 1998 from the borehole at borings BH-10, BH-11, BH-12, and BH-13. Due to safety and logistical considerations, permanent wells could not be installed in this high traffic area. PCBs were detected in groundwater samples from all borings, except BH-10.

Laboratory analytical results from the previous investigation are included in Appendix E.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. March 11, 2004.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

AOC 14 – Raw Slag Area

UNIT DESCRIPTION: The Raw Slag Area is located in the northwestern portion of the Slag Processing Area. The unit is unable to be spatially defined due to the daily change in volume of raw slag, but is approximately 300,000 square feet and boring logs from MDA-26 and MDA-27 indicate the slag is approximately 5 feet thick in the Raw Slag Area. The Raw Slag Area is located directly south of Dicks Creek and in between Mill Scale Area 1 (AOC 11) and the B-Scrap Area. Surface drainage from this unit is to the east, toward a topographically low spot where surface water collects during periods of substantial rainfall.

MATERIALS MANAGED: Raw steel slag is managed in the Raw Slag Area. Raw slag is composed predominantly of calcium silicate. AK Steel estimates 16 steel slag pots are delivered to the Raw Slag Area each day. Each pot contains approximately 25 tons of slag. The slag pots containing molten slag are dumped into one of four pits formed by solidified slag. Each pit is approximately 30 feet wide by 100 feet long and will typically hold four pots of slag.

LOCATION: The Raw Slag Area is located directly south of Dicks Creek and in between Mill Scale Area 1 (AOC 11) and the B-Scrap Area.

PERIOD OF OPERATION: The current Slag Processing Area was used as farmland until 1961 as evidenced by aerial photographs. In 1965 McGraw Construction purchased the land and began slag processing activities. Aerial photographs taken on April 1, 1973 indicate the presence of slag in this vicinity. The Raw Slag Area is currently in operation.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently there is no waste stored in the Raw Slag Area.

ENGINEERED CONTROLS: Slag is placed in pits formed by solidified slag, to provide containment of cooling water added. The slag air-cools in the pits for approximately four hours before water is applied. The slag is normally at a temperature of 2,000 ºF when water is applied. Water is sprayed on the steel slag for approximately four hours using a 2-inch diameter hose equipped with a 1.5-inch nozzle.

DESCRIPTION OF RELEASES: There are no documented releases associated with the Raw Slag Area.

PREVIOUS INVESTIGATIONS: No specific previous investigations have taken place in the Raw Slag Area. However, monitoring wells GM-46SR and MDA-27S are located north, MDA-28S is located east, and MDA-22P is located southwest of the Raw Slag Area. GM-46SR, MDA-27S, and MDA-28S were sampled for polychlorinated biphenyls (PCBs) in August and September 2000. There were no detections for PCBs during this sampling event. In September 2001 no detections of PCBs were present in MDA-28S. In October 2001 MDA-27S was sampled for PCB Homologues and had a concentration of 1.38 ug/L. BH-22, which was later converted to MDA-22PR, displayed no concentrations of PCBs in soil samples collected from 0 to 2, 6 to 8, and 9 to 10 feet below land surface. MDA-22PR was sampled in June-July 1998 for PCB Aroclors and in December 2001 for PCB Homologues. There were no detections of PCBs in the MDA-22PR June-July 1998 sample, while the December 2001 contained 1.71 ug/L of PCBs.

Laboratory analytical results from the previous investigation are included in Appendix E.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Alternatives and Reuse Assessment-Water Use in Slag Processing Operations, Olympic Mills Services Operations Area, AK Steel Middletown, Ohio. February 7, 2002.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

AOC 15 – Finished Slag Area

UNIT DESCRIPTION: The Finished Slag Area is a relatively small unit comprising approximately 2,500 square feet used for storage of slag.

MATERIALS MANAGED: Slag is managed in the Finished Slag Area. Finished slag is composed predominantly of calcium silicate. Once slag is removed from the Raw Slag Area pits (AOC 14) it is placed in piles at the Finished Slag Area.

LOCATION: The Finished Slag Area is located in the west-central portion of the Slag Processing Area, in between Mill Scale Area 1 (AOC 11) and Mill Scale Area 2 (AOC 12).

PERIOD OF OPERATION: The current Slag Processing Area was used as farmland until 1961 as evidenced by an aerial photograph. In 1965 McGraw Construction purchased the land and began slag processing activities. Aerial photographs taken on April 1, 1973 indicate the presence of slag in this vicinity. The Raw Slag Area is currently in operation.

CURRENT WASTE MANAGEMENT DESCRIPTION: Currently there is no waste stored in the Finished Slag Area.

ENGINEERED CONTROLS: In the Finished Slag Area, piles of slag are sprayed with water to prevent redevelopment of dust and to expedite the cooling process. Two water sprayers are located adjacent to the piles. The spray header is a 1.5-inch galvanized steel pipe.

DESCRIPTION OF RELEASES: There are no documented releases in the Finished Slag Area.

PREVIOUS INVESTIGATIONS: During an investigation in 1998, boring BH-22 was located in the southwest portion of the Finished Slag Area. BH-22 displayed no concentrations of polychlorinated biphenyls (PCBs) in soil samples collected from 0 to 2, 6 to 8, and 9 to 10 feet below land surface. Boring BH-22 was converted into monitoring well MDA-22P. MDA-22P was sampled in June-July 1998 for PCB Aroclors. In 2001, monitoring well MDA-22PR was installed to replace the unlocated well MDA-22P. There were no detections of PCB Aroclors in groundwater from well MDA-22P (June-July 1998). In December 2001 PCB Homologues concentrations of 1.71ug/L were present in well MDA-22PR.

Laboratory analytical results are presented in Appendix E.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Alternatives and Reuse Assessment-Water Use in Slag Processing Operations, Olympic Mills Services Operations Area, AK Steel Middletown, Ohio. February 7, 2002.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Interview with Mr. Steve Francis, AK Steel Corporation, Senior Staff Environmental Engineer, February 25, 1998.

Interview with Mr. Mike Fischer, IMS, Assistant Superintendent, Mr. Jerry Piccioni, IMS, Site General Manager, and Mr. Mike Connolly, EnviroSource, Director, Environmental Engineering, February 26, 1998.

AOC 16 – 7 Oil Transformer Locations

UNIT DESCRIPTION: The 7 Oil Transformers were located throughout the Slag Processing Area. One electric, concrete-pad mounted transformer was located between Mill Scale Areas 1 and 2 (AOC 11 and AOC 12, respectively). It was located beneath a conveyor system. One pole-mounted transformer was located near the center of the conveyor system, in the finished slag area

MATERIALS MANAGED: AK Steel records indicate that the polychlorinated biphenyl (PCB0 electric power transformers were removed or replaced with non-PCB power equipment.

LOCATION: The 7 Former Oil Transformer Locations were located throughout the Slag Processing Area. Most notably there were four locations within the Finished Slag Area (AOC 15).

PERIOD OF OPERATION: The period of operation of the 7 Oil Transformer Locations is unknown.

CURRENT WASTE MANAGEMENT DESCRIPTION: The former 7 Oil Transformer Locations are no longer present on-site.

ENGINEERED CONTROLS: It is unknown whether the former 7 Oil Transformer Locations had engineering controls.

DESCRIPTION OF RELEASES: There are no documented releases associated with the 7 Former Oil Transformer Locations.

PREVIOUS INVESTIGATIONS: The former 7 Oil Transformer Locations were first investigated in 1997 when soil samples were collected and analyzed for the seven locations. Results from these analyses indicated that only two samples from the conveyor transformer location contained PCBs, while samples collected from all other locations showed non-detectable concentrations. Results of analysis of five additional soil samples collected in June and July 1998 at the conveyor transformer location indicated a detection of PCBs in soil at concentrations ranging from 0.94 mg/kg to 1.05 mg/kg in two samples from the upper 6 inches of soil and two samples from a depth of 1 to 2 feet. Groundwater samples were not collected at the former transformer locations.

During an investigation in 1998, boring BH-22 was located in the southwest portion of the Finished Slag Area. BH-22 displayed no concentrations of polychlorinated biphenyls (PCBs) in soil samples collected from 0 to 2, 6 to 8, and 9 to 10 feet below land surface. Boring BH-22 was converted into monitoring well MDA-22P. MDA-22P was sampled in June-July 1998 for PCB Aroclors. In 2001, monitoring well MDA-22PR was installed to replace the unlocated well MDA-22P. There were no detections of PCB Aroclors in groundwater from well MDA-22P (June-July 1998). In December 2001 PCB Homologues concentrations of 1.71 ug/L were present in well MDA-22PR.

Laboratory analytical results are presented in Appendix E.

DATA GAPS: There appears to be no data gaps for this SWMU.

INFORMATION SOURCES:

ARCADIS, Soil and Groundwater Investigation Plan, Olympic Mills Services Operation Area, AK Steel Property, Middletown, Ohio. July 2001.

ARCADIS, Soil and Groundwater Investigation Report, Olympic Mills Services Operations Area, AK Steel Corporation, Middletown, Ohio. February 8, 2002.

Chirlin, Gary, R., Ph.D., P.E., Expert Report, Surface-water and Ground-water Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. November 10, 2003.

Hamper, Martin, Rebuttal Expert Report of Dr. Gary Chirlin, Surface-Water and Groundwater Contamination at the AK Steel Works, Middletown, Ohio. Prepared for the U.S. Department of Justice, Environmental Enforcement Section, Civil Action No. C-1-00530, United States District Court, Southern District of Ohio, Western Division. March 11, 2004.

ARCADIS

Additional Areas

Additional Areas (AAs)

Unit Description: The Additional Areas, AA 01 through AA 09, are designated areas where it is suggested that dredge spoils from the channelization of Dicks Creek were placed. These spoils may contain PCBs. All of the AA locations are located off-site of AK Steel property. Dicks Creek was channelized in the 1960s as the Miami Conservancy District's flood control program. The creek was channelized from the slag hauler road bridge on the east to the Yankee Road Bridge to the west. Aerial photographs were taken by the Butler County Soil and Water Conservation District in this area before dredging activities on August 11, 1962 and following dredging activities on October 19, 1968. A description of these properties is presented below.

AA 01 – Floodplain Area West of Yankee Road (Vicinity of USEPA Sample S23)
AA 01 is located southwest of the Middletown Works and west of Yankee Road. Further action at AA 01 will be conducted in association with the Interim Measures Scope of Work.

AA 02 – Former Glenn Cartage Property (NS of DC, East of Yankee Road)
The Former Glenn Cartage Property is located southwest of the Middletown Works and on the north side of Dicks Creek to the east of the Yankee Road Bridge. The aerial photographs from 1962 indicate that there appears to be a building or other structure with a semi-circular driveway. A partially wooded field is located to the south of this structure. In 1968 the land appeared to be similar to 1962, other than the area approximately 25-feet north of Dicks Creek where dredging activities had disturbed the soil. Currently, the area is flat with sparse vegetation. The property is surrounded by a secured fence.

AA 03 – Sturgell Property (NS of DC, West of RR Bridge, East of Yankee Road)
The Thomas Sturgell Property is located southwest of the Middletown Works and on the north side of Dicks Creek directly west of a railroad bridge. The property is bordered on the north by Oxford State Road. Aerial photographs from 1962 indicate that this property has a house in the vicinity of Oxford State Street and farm fields in the southern portion of the property. The 1968 aerial photographs indicate that approximately the southern three-fourths of the property had been disturbed. No trees are present and the soil appeared to not have any vegetation growing. Currently, the Thomas Sturgell Property has a residence on the northern portion with a partially wooded lot to the southern portion.

AA 04 – Back Half of Properties between Glenn Cartage and Sturgell Properties (NS of DC)
The properties located southwest of the Middletown Works and between Glenn Cartage and Sturgell properties are bordered to the south by Dicks Creek and to the north by Oxford State Road. Aerial photographs from 1962 indicate that these properties had residences adjacent to Oxford State Road with partially wooded farm fields to the south. The 1968 aerial photographs indicate that only a small portion of the southern extent of these properties was disturbed by dredging activities. Soil was disturbed approximately 25-feet to the north of Dicks Creek. Currently, the southern portions of these properties contain partially wooded fields.

AA 05 – Old Armco Lot NS DC, North of Big Meander
The Old Armco Lot is located south of the Middletown Works and to the north of a historic Dicks Creek stream meander and bordered to the north by Oxford State Road. In 1962, prior to channelization, Dicks Creek meandered to the north at this property. The aerial photographs indicate several structures on a partially wooded lot. The aerial photographs in 1968, after channelization, indicated that the stream meander had been removed and most likely filled in. The southern portion of the property appeared to have been disturbed, however the area contained a few trees. Currently, the Old Armco Lot is a scrap metal yard with various sources of scrap such as cars, trailers, buses, and refrigerators. There are a few abandoned buildings on the property.

AA 06 – Former Burridge Machine Shop Property, NS DC (now a dairy outlet)
The Former Burridge Machine Shop Property is located south of the Middletown Works, to the west of slag hauler road, bordered to the south by Dicks Creek, and to the north by Oxford State Road. Aerial photographs from 1962 indicated a building in the northern portion of the property and a partially wooded lot in the southern portion. In 1968, soil appeared to be disturbed in the extreme southern portion of the property; a tree line on the eastern extent of the boundary is still present. Currently, a distribution warehouse and associated paved parking lot reside in the northern half of the property with a partially wooded lot in the southern portion.

AA 07 – Former Cecil Osburn Lot (located between Stations 12-18, NS of DC)
The Former Cecil Osburn Lot (Stations 12-18) is located southwest of the Middletown Works, to the east of a railroad bridge, bordered to the south by Dicks Creek and the north by Oxford State Road. The 1962 aerial photographs indicated that this property has buildings on the northern portion and a partially wooded lot to the south. The 1968 aerial photographs indicated disturbed soil in the extreme southern portion of the property adjacent to Dicks Creek. Currently, the property contains a residence in the northern portion and a partially wooded lot to the south.

AA 08 – Pipeline Fill, Stations 32-36, along Oxford State Road, north of Outfall 002
The Pipeline Fill Area (Stations 32-36) is located south of the Middletown Works and along Oxford State Road to the east of the Old Armco Lot (AA 05). In reviewing aerial photographs there appeared to be no noticeable change during the time in which the Dicks Creek channelization was occurring. Currently, the area of the Pipeline Fill Area is residential properties.

AA 09 – Remainder of Orman's Welding Property
The Orman's Welding Property is located southwest of the Middletown Works, to the south of Dicks Creek and west of Yankee Road. Aerial photographs from 1962 indicated this property was a partially wooded field. The 1968 aerial photographs indicated that the property appeared to have had heavy construction with a new building and most of the trees in the vicinity were removed. Currently, the Ormans Welding Center is owned by MTR Martco and used as a welding shop and warehouse.

DATA GAPS The release potential into the environment has not been assessed, due to the management of PCB material in the sediments/soils during Dicks Creek channelization is considered a data gap.

INFORMATION SOURCES:

Aerial Photograph 1962, Butler County Soil Conservation Service.

Aerial Photograph 1968, Butler County Soil Conservation Service.